| | | | | | |
|---|---|---|---|---|---|
| 4736.787 | 78.9 | 0.310 | 0.24 | 4736.785 | Fe I(554)4736.7734(12) |
| 4737.348 | 18.4 | 0.067 | 0.26 | 4737.346 | Cr I(145)4737.33(75) |
| 4737.656 | 6.5 | 0.025 | 0.25 | 4737.653 | Fe I(590)4737.6354((1)) |
| 4738.347 | 4.2 | 0.015 | 0.27 | 4738.345 | Mn II(5)4738.29(-) |
| 4739.103 | 11.0 | 0.043 | 0.24 | 4739.101 | Mn I(21)4739.110(25) |
| 4740.289 | 12.3 | 0.037 | 0.31 | 4740.287 | Fe I(409)4740.3401((1)),La II(8) 4740.128(500) |
| 4740.469 | 8.9 | 0.031 | 0.27 | 4740.467 | |
| 4741.018 | 13.7 | 0.046 | 0.28 | 4741.016 | Fe I(688)4741.0696((1)),Cr I(292) 4741.089(12) |
| 4741.540 | 25.7 | 0.111 | 0.22 | 4741.538 | Fe I(n)4741.5297(3) |
| 4742.830 | 11.4 | 0.023 | 0.46 | 4742.828 | Ti I(233)4742.791(20) |
| 4744.391 | 21.3 | 0.085 | 0.23 | 4744.389 | |
| 4745.807 | 30.5 | 0.131 | 0.22 | 4745.805 | Fe I(821)4745.8001(3n) |
| 4748.145 | 42.3 | 0.169 | 0.24 | 4748.143 | |
| 4748.684 | 1.5 | 0.009 | 0.15 | 4748.682 | La II(65)4748.73(150) |
| 4749.971 | 7.0 | 0.028 | 0.23 | 4749.969 | Fe I(1206*)4749.9477((1)) |
| 4751.095 | 8.5 | 0.030 | 0.27 | 4751.093 | Fe I (n)4751.0843 (?) |
| 4751.942 | 6.8 | 0.017 | 0.38 | 4751.939 | |
| 4752.135 | 8.7 | 0.044 | 0.19 | 4752.132 | Ni I(165)4752.124((3)),Cr I(-) 4752.066(50) |
| 4752.417 | 12.5 | 0.069 | 0.17 | 4752.415 | Ni I(132)4752.426(4) |
| 4752.581 | 5.1 | 0.019 | 0.25 | 4752.579 | |
| 4754.046 | 59.4 | 0.245 | 0.23 | 4754.043 | Mn I(16)4754.048(50H) |
| 4754.760 | 11.0 | 0.044 | 0.23 | 4754.757 | Ni I(141)4754.768(3),Cr I(168) 4754.743(20) |
| 4755.749 | 11.7 | 0.046 | 0.24 | 4755.747 | Mn II(5) 4755.728(0n) |
| 4756.127 | 27.4 | 0.117 | 0.22 | 4756.125 | Cr I(145)4756.09(100) |
| 4756.520 | 35.5 | 0.149 | 0.22 | 4756.518 | Ni I(98)4756.519(10) |
| 4757.583 | 15.5 | 0.063 | 0.23 | 4757.581 | Fe I(634*)4757.5780((2)) |
| 4758.133 | 9.2 | 0.039 | 0.22 | 4758.130 | Ti I(233)4758.120(25) |
| 4759.275 | 9.2 | 0.043 | 0.20 | 4759.272 | Ti I(233)4759.272(25) |
| 4761.093 | 5.4 | 0.021 | 0.25 | 4761.090 | |
| 4761.527 | 20.3 | 0.085 | 0.23 | 4761.524 | Mn I(21)4761.527(50) |
| 4762.374 | 55.7 | 0.229 | 0.23 | 4762.372 | Mn I(21)4762.376(80), C I(6) 4762.41(4) |
| 4762.566 | 14.2 | 0.067 | 0.20 | 4762.563 | Ni I(71)4762.627(3) |
| 4762.768 | 18.7 | 0.084 | 0.21 | 4762.766 | Ti II(17)4762.790(6) |
| 4763.912 | 42.9 | 0.180 | 0.22 | 4763.910 | Ni I(146)4763.950(4),Ti II(48) 4763.892(8) |
| 4764.292 | 3.9 | 0.020 | 0.18 | 4764.290 | Cr I(231)4764.298(50) |
| 4764.526 | 19.0 | 0.079 | 0.23 | 4764.523 | Ti II(48)4764.536(7),Cr I(124) 4764.643(20) |
| 4764.773 | 5.1 | 0.015 | 0.31 | 4764.771 | |
| 4765.230 | 5.6 | 0.020 | 0.26 | 4765.228 | |
| 4765.493 | 12.0 | 0.069 | 0.16 | 4765.491 | Fe I(40)4765.485((1)) |
| 4765.871 | 25.1 | 0.112 | 0.21 | 4765.869 | Mn I(21)4765.856(60) |
| 4766.424 | 32.7 | 0.147 | 0.21 | 4766.421 | Mn I(21)4766.426(70) |
| 4766.706 | 19.0 | 0.049 | 0.36 | 4766.704 | C I(6)4766.63(2),Cr I(231)4766.63 (35) |
| 4767.890 | 2.2 | 0.014 | 0.15 | 4767.888 | Cr I(231)4767.860(30) |
| 4768.350 | 33.0 | 0.135 | 0.23 | 4768.348 | Fe I(821)4768.3203((1)),Fe I(384) 4768.3969(3n) |
| 4768.707 | 5.0 | 0.021 | 0.22 | 4768.705 | Fe I (n) 4768.6988 (?) |
| 4769.953 | 5.9 | 0.036 | 0.16 | 4769.951 | C I(6)4770.00(2) |
| 4770.140 | 3.0 | 0.019 | 0.15 | 4770.138 | |
| 4771.131 | 3.1 | 0.012 | 0.23 | 4771.128 | Co I(156)4771.108(6) |
| 4771.463 | 33.5 | 0.114 | 0.28 | 4771.460 | |
| 4771.737 | 31.2 | 0.123 | 0.24 | 4771.734 | C I(6)4771.721(4),Fe I(67) 4771.6969((1)) |

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| | | | | | .983,.991(40) |
| 4703.803 | 12.5 | 0.060 | 0.19 | 4703.800 | Ni I(33)4703.808(4) |
| 4704.478 | 5.7 | 0.022 | 0.25 | 4704.475 | Sm II(1)4704.397(500) |
| 4704.955 | 20.9 | 0.092 | 0.21 | 4704.952 | Fe I(821)4704.9481((5)) |
| 4705.496 | 5.2 | 0.025 | 0.20 | 4705.493 | Fe I(752)4705.4570((1)) |
| 4706.564 | 6.7 | 0.037 | 0.17 | 4706.561 | (V I(119)4706.574(12)) |
| 4707.269 | 50.2 | 0.230 | 0.21 | 4707.266 | Fe I(554)4707.2745(8) |
| 4707.454 | 22.2 | 0.083 | 0.25 | 4707.451 | Fe I(n)4707.4877((2)) |
| 4708.022 | 16.1 | 0.079 | 0.19 | 4708.019 | Cr I(186)4708.02(60) |
| 4708.670 | 33.5 | 0.142 | 0.22 | 4708.667 | Ti II(49)4708.651(9) |
| 4709.063 | 36.2 | 0.137 | 0.25 | 4709.060 | Fe I(821)4709.0881((3)) |
| 4709.712 | 13.3 | 0.064 | 0.19 | 4709.708 | Mn I(21)4709.710(40) |
| 4710.282 | 40.9 | 0.167 | 0.23 | 4710.279 | Fe I(409)4710.2833(5) |
| 4712.107 | 3.2 | 0.015 | 0.21 | 4712.104 | Fe I(467)4712.1057((1)) |
| 4714.082 | 9.2 | 0.031 | 0.27 | 4714.079 | Fe I(1206*)4714.0703((1n)) |
| 4714.417 | 70.1 | 0.275 | 0.24 | 4714.414 | Ni I(98)4714.421(25) |
| 4715.765 | 30.2 | 0.133 | 0.21 | 4715.762 | Ni I(98)4715.778(8) |

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| 4707.289 | 59.3 | 0.257 | 0.22 | 4707.287 | Fe I(554)4707.2745(8) |
| 4707.505 | 16.7 | 0.078 | 0.20 | 4707.502 | Fe I(n)4707.4877((2)) |
| 4708.022 | 16.9 | 0.073 | 0.22 | 4708.020 | Cr I(186)4708.02(60) |
| 4708.678 | 34.6 | 0.147 | 0.22 | 4708.676 | Ti II(49)4708.651(9) |
| 4709.071 | 36.6 | 0.137 | 0.25 | 4709.068 | Fe I(821)4709.0881((3)) |
| 4709.722 | 13.9 | 0.065 | 0.20 | 4709.720 | Mn I(21)4709.710(40) |
| 4710.288 | 41.9 | 0.170 | 0.23 | 4710.286 | Fe I(409)4710.2833(5) |
| 4711.513 | 7.7 | 0.032 | 0.23 | 4711.511 | |
| 4712.087 | 9.9 | 0.030 | 0.31 | 4712.084 | Fe I(467)4712.1057((1)) |
| 4712.408 | 4.4 | 0.014 | 0.31 | 4712.406 | |
| 4712.636 | 1.6 | 0.012 | 0.13 | 4712.634 | |
| 4712.851 | 8.0 | 0.022 | 0.35 | 4712.849 | |
| 4713.179 | 3.5 | 0.020 | 0.17 | 4713.177 | (Fe II(26)4713.18(p)) |
| 4714.075 | 13.4 | 0.048 | 0.26 | 4714.073 | Fe I(1206*)4714.0703((1n)) |
| 4714.423 | 73.9 | 0.293 | 0.24 | 4714.420 | Ni I(98)4714.421(25) |
| 4717.588 | 7.7 | 0.034 | 0.21 | 4717.585 | (La II(87)4717.58(50)) |
| 4718.428 | 22.1 | 0.101 | 0.21 | 4718.426 | Cr I(186)4718.43(75) |
| 4719.565 | 6.6 | 0.018 | 0.35 | 4719.563 | Ti II(59)4719.533(5) |
| 4720.150 | 2.6 | 0.010 | 0.23 | 4720.147 | (Fe II(54)4720.15(p)) |
| 4720.980 | 10.3 | 0.050 | 0.19 | 4720.978 | Fe I(1071,409)4720.997((1)) |
| 4722.167 | 31.8 | 0.137 | 0.22 | 4722.165 | Zn I(2)4722.159(75) |
| 4723.224 | 5.7 | 0.017 | 0.31 | 4723.222 | Ti I(75)4723.171(10) |
| 4724.431 | 5.3 | 0.022 | 0.23 | 4724.429 | Cr I(145)4724.40(35),(La II(50) 4724.42(40)) |
| 4726.094 | 4.5 | 0.014 | 0.31 | 4726.092 | Fe I(384)4726.1370((1)) |
| 4727.141 | 4.1 | 0.025 | 0.15 | 4727.139 | Cr I(99)4727.13(40) |
| 4727.424 | 47.1 | 0.178 | 0.25 | 4727.421 | Fe I(821)4727.3946(3n),Mn I(21) 4721.462(30) |
| 4728.552 | 37.7 | 0.156 | 0.23 | 4728.549 | Fe I(822)4728.5457(3n) |
| 4729.029 | 9.8 | 0.047 | 0.20 | 4729.026 | Fe I(n)4729.0192((1))) |
| 4729.305 | 3.5 | 0.019 | 0.18 | 4729.303 | Ni I(235)4729.291(2) |
| 4729.683 | 12.3 | 0.041 | 0.28 | 4729.681 | Fe I(688)4729.6766((1)),Cr I(K) 4729.708(35) |
| 4730.050 | 20.4 | 0.086 | 0.22 | 4730.047 | Mg I(10)4730.0285((2)) |
| 4730.475 | 5.8 | 0.017 | 0.31 | 4730.473 | (Mn II(5)4730.361(-)) |
| 4730.698 | 6.9 | 0.040 | 0.16 | 4730.696 | Cr I(145)4730.69(50)) |
| 4730.962 | 14.0 | 0.033 | 0.40 | 4730.959 | |
| 4731.464 | 58.7 | 0.255 | 0.22 | 4731.461 | Fe II(43)4731.439(3) |
| 4731.797 | 11.1 | 0.044 | 0.24 | 4731.794 | Ni I(163)4731.809(3) |
| 4732.475 | 8.5 | 0.039 | 0.20 | 4732.473 | Ni I(235)4732.465(3) |
| 4733.598 | 35.1 | 0.146 | 0.23 | 4733.596 | Fe I(38)4733.5917(4) |
| 4734.151 | 13.1 | 0.036 | 0.34 | 4734.148 | Fe I(1133)4734.0980((1)) |
| 4735.861 | 22.7 | 0.099 | 0.21 | 4735.858 | Fe I(1042)4735.8439((2)) |

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| 4656.481 | 16.5 | 0.067 | 0.23 | 4656.478 | Ti I(6)4656.468(25) |
| 4656.989 | 30.8 | 0.127 | 0.23 | 4656.985 | Fe II(43)4656.974(1) |
| 4657.221 | 32.8 | 0.141 | 0.22 | 4657.218 | Ti II(59)4657.212(9) |
| 4657.574 | 4.2 | 0.016 | 0.24 | 4657.571 | Fe I(n)4637.5848((1)) |
| 4660.444 | 5.1 | 0.019 | 0.25 | 4660.440 | Fe I(n)4660.4315 (?) |
| 4660.911 | 4.5 | 0.017 | 0.25 | 4660.908 | (Fe II(146)4660.93(p)) |
| 4661.550 | 10.7 | 0.046 | 0.22 | 4661.546 | Fe I(n)4661.5344((2n)) |
| 4661.980 | 9.6 | 0.037 | 0.24 | 4661.977 | Fe I(409)4661.9703((2)) |
| 4662.784 | 6.8 | 0.020 | 0.31 | 4662.781 | |
| 4663.296 | 16.4 | 0.048 | 0.32 | 4663.292 | Cr I(186)4663.327(40) |
| 4663.753 | 27.3 | 0.092 | 0.28 | 4663.750 | La II(82)4663.76(300),Cr I(186) 4663.833(55) |
| 4664.798 | 12.8 | 0.055 | 0.22 | 4664.794 | Cr I(186)4664.80(60) |
| 4665.899 | 13.7 | 0.055 | 0.24 | 4665.896 | Cr I(233)4665.899(35) |
| 4666.141 | 3.9 | 0.043 | 0.08 | 4666.138 | Cr I(99)4666.201(25) |
| 4666.465 | 6.9 | 0.048 | 0.14 | 4666.461 | Cr I(186)4666.508(55) |
| 4666.740 | 53.6 | 0.202 | 0.25 | 4666.737 | Fe II(37)4666.750(2) |
| 4667.071 | 13.4 | 0.054 | 0.23 | 4667.067 | Cr I(99)4667.170(30) |
| 4667.467 | 78.3 | 0.263 | 0.28 | 4667.463 | Fe I(822)4667.4531(6) |
| 4667.774 | 9.4 | 0.051 | 0.17 | 4667.771 | Ni I(163)4667.766(3) |
| 4668.138 | 55.5 | 0.241 | 0.22 | 4668.135 | Fe I(554)4668.1344(6) |
| 4668.593 | 7.8 | 0.034 | 0.22 | 4668.589 | |
| 4669.194 | 31.7 | 0.125 | 0.24 | 4669.190 | Fe I(821)4669.1711((4)) |
| 4670.169 | 16.6 | 0.078 | 0.20 | 4670.166 | Fe II(25)4670.17(0) |
| 4670.408 | 45.7 | 0.181 | 0.24 | 4670.405 | Sc II(24)4670.404(15) |
| 4671.420 | 5.2 | 0.021 | 0.23 | 4671.417 | Fe I (n) 4671.4147 (?) |
| 4672.327 | 24.3 | 0.089 | 0.26 | 4672.324 | |
| 4672.822 | 9.4 | 0.026 | 0.34 | 4672.818 | Fe I(40)4672.8305(p) |
| 4673.188 | 35.5 | 0.141 | 0.24 | 4673.185 | Fe I(820)4673.1636((4)) |
| 4674.083 | 10.5 | 0.034 | 0.29 | 4674.080 | |
| 4678.173 | 26.4 | 0.098 | 0.25 | 4678.169 | Cd I(2)4678.160(50) |
| 4678.850 | 58.1 | 0.235 | 0.23 | 4678.847 | Fe I(821)4678.8458(7) |
| 4679.212 | 15.1 | 0.064 | 0.22 | 4679.208 | Fe I(n,n)4679.2247((1)) |
| 4680.171 | 21.5 | 0.075 | 0.27 | 4680.167 | Zn I(2)4680.138(45) |
| 4680.512 | 15.3 | 0.055 | 0.26 | 4680.509 | Cr I(186)4680.492(50),Fe I(n) 4680.4672((1)) |
| 4680.860 | 7.1 | 0.028 | 0.24 | 4680.856 | Cr I(170)4680.864(35) |
| 4681.454 | 5.9 | 0.029 | 0.19 | 4681.451 | |
| 4681.906 | 6.6 | 0.040 | 0.16 | 4681.902 | Ti I(6)4681.91(30) |
| 4682.040 | 20.8 | 0.058 | 0.34 | 4682.037 | |
| 4682.349 | 12.1 | 0.038 | 0.30 | 4682.346 | Y II(12)4682.321(794),Co I(156) 4682.361(9) |
| 4683.557 | 8.1 | 0.049 | 0.16 | 4683.554 | Fe I(n)4683.5597((2)) |
| 4685.261 | 20.5 | 0.078 | 0.25 | 4685.258 | Ca I(51)4685.265(12) |
| 4686.213 | 19.5 | 0.079 | 0.23 | 4686.209 | Ni I(98)4686.218(5) |
| 4687.393 | 5.6 | 0.020 | 0.26 | 4687.390 | Fe I(348)4687.3865((1)) |
| 4688.183 | 10.3 | 0.045 | 0.21 | 4688.180 | Fe I (n) 4688.1761 (?) |
| 4688.530 | 10.2 | 0.018 | 0.54 | 4688.526 | |
| 4689.432 | 8.3 | 0.034 | 0.23 | 4689.429 | Cr I(186)4689.382(65),Ti II(38) 4689.46(p) |
| 4690.152 | 16.0 | 0.064 | 0.23 | 4690.148 | Fe I(820)4690.1380((3)) |
| 4691.407 | 45.0 | 0.191 | 0.22 | 4691.404 | Fe I(409)4691.4117(6),Ti I(75) 4691.336(20) |
| 4691.593 | 12.5 | 0.051 | 0.23 | 4691.589 | (Fe II(17)4691.55(p) |
| 4694.093 | 9.7 | 0.038 | 0.24 | 4694.089 | |
| 4694.879 | 6.1 | 0.028 | 0.21 | 4694.875 | Fe I (n) 4694.8593 (?) |
| 4698.398 | 8.7 | 0.036 | 0.22 | 4698.395 | Cr I(186)4698.46(60) |
| 4698.614 | 29.9 | 0.077 | 0.36 | 4698.610 | Cr I(62,146)4698.61(50) |
| 4699.356 | 28.0 | 0.115 | 0.23 | 4699.353 | |
| 4700.158 | 17.8 | 0.080 | 0.21 | 4700.155 | Fe I(n)4700.1579((2n)) |
| 4701.061 | 7.2 | 0.029 | 0.23 | 4701.058 | Fe I(820,n)4701.0447((1)) |
| 4701.500 | 19.7 | 0.062 | 0.30 | 4701.497 | Ni I(235)4701.536(3) |
| 4702.998 | 140.5 | 0.450 | 0.29 | 4702.995 | Mg I(11,11,11) 4702.975, |

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| 4621.932 | 8.2 | 0.039 | 0.20 | 4621.929 | Cr I(32,244)4621.924(45) |
| 4622.437 | 7.3 | 0.037 | 0.18 | 4622.434 | Cr I(133)4622.466(35) |
| 4622.728 | 5.7 | 0.015 | 0.37 | 4622.725 | Cr I(81)4622.759(22) |
| 4623.104 | 10.3 | 0.050 | 0.19 | 4623.101 | Ti I(145)4623.098(25) |
| 4623.630 | 1.7 | 0.012 | 0.14 | 4623.627 | |
| 4625.052 | 45.3 | 0.181 | 0.24 | 4625.049 | Fe I(554)4625.0453(3) |
| 4625.886 | 4.0 | 0.020 | 0.19 | 4625.883 | Fe II(186)4625.911(1),(Cr I(244) 4625.913(20)) |
| 4626.182 | 31.0 | 0.134 | 0.22 | 4626.179 | Cr I(21)4626.181(65) |
| 4627.419 | 4.5 | 0.021 | 0.21 | 4627.416 | |
| 4628.178 | 7.4 | 0.039 | 0.18 | 4628.175 | Ce II(1)4628.16(1700) |
| 4629.342 | 90.6 | 0.360 | 0.24 | 4629.339 | Fe II(37)4629.336(7),Ti I(145) 4029.336(15) |
| 4630.123 | 23.3 | 0.105 | 0.21 | 4630.120 | Fe I(115)4630.1203((2)) |
| 4632.901 | 39.9 | 0.153 | 0.25 | 4632.898 | Fe I(39)4632.9117(2) |
| 4634.079 | 53.4 | 0.228 | 0.22 | 4634.076 | Cr II(44)4634.10(40) |
| 4634.706 | 6.2 | 0.034 | 0.17 | 4634.703 | |
| 4635.327 | 16.0 | 0.071 | 0.21 | 4635.324 | Fe II(186)4635.328(5) |
| 4635.859 | 10.2 | 0.051 | 0.19 | 4635.856 | Fe I(349)4635.8462((1)) |
| 4636.375 | 2.5 | 0.024 | 0.10 | 4636.372 | Ti II(38)4636.341(6) |
| 4637.161 | 2.2 | 0.014 | 0.15 | 4637.158 | Cr I(32)4637.174(40) |
| 4637.512 | 41.3 | 0.170 | 0.23 | 4637.509 | Fe I(554)4637.5034(3) |
| 4638.008 | 43.6 | 0.182 | 0.23 | 4638.005 | Fe I(822)4638.0098(3) |
| 4639.358 | 6.9 | 0.035 | 0.19 | 4639.355 | Ti I(145)4639.369(18) |
| 4639.641 | 10.5 | 0.035 | 0.28 | 4639.638 | Ti I(145)4639.669(15),Cr I(186) 4639.538(35) |
| 4639.961 | 3.3 | 0.023 | 0.14 | 4639.958 | Ti I(145)4639.944(15) |
| 4640.284 | 8.9 | 0.038 | 0.22 | 4640.281 | |
| 4641.189 | 11.8 | 0.028 | 0.40 | 4641.186 | (Fe I(347)4641.22(p)) |
| 4643.466 | 32.0 | 0.136 | 0.22 | 4643.463 | Fe I(820)4643.4634(2) |
| 4645.168 | 1.6 | 0.011 | 0.15 | 4645.165 | Ti I(145)4645.193(12) |
| 4646.167 | 57.5 | 0.241 | 0.22 | 4646.164 | Cr I(21)4646.151(100) |
| 4646.589 | 14.4 | 0.030 | 0.46 | 4646.586 | Cr I(147)4646.495(15) |
| 4647.432 | 57.4 | 0.226 | 0.24 | 4647.429 | Fe I(409)4647.4342(6) |
| 4647.969 | 19.6 | 0.056 | 0.33 | 4647.966 | |
| 4648.647 | 42.4 | 0.181 | 0.22 | 4648.644 | Ni I(98)4648.659(15) |
| 4648.883 | 11.6 | 0.041 | 0.27 | 4648.880 | Cr I(32)4648.868(35) |
| 4649.477 | 11.0 | 0.026 | 0.40 | 4649.474 | Cr I(32)4649.446(45) |
| 4650.015 | 10.6 | 0.014 | 0.70 | 4650.012 | Ti I(145)4650.016(10) |
| 4651.285 | 26.7 | 0.105 | 0.24 | 4651.282 | Cr I(21)4651.285(75) |
| 4652.164 | 45.2 | 0.192 | 0.22 | 4652.161 | Cr I(21)4652.155(100) |
| 4654.578 | 98.1 | 0.325 | 0.28 | 4654.575 | Fe I(39)4654.4987(5),Fe I(554,821) 4654.6050;.6286(5) |
| 4655.720 | 11.9 | 0.029 | 0.38 | 4655.717 | (Ti II(38)4655.75(p)) |
| 4656.158 | 3.0 | 0.023 | 0.12 | 4656.155 | Cr I(147)4656.183(30) |
| 4656.464 | 18.9 | 0.068 | 0.26 | 4656.461 | Ti I(6)4656.468(25) |
| 4656.964 | 24.7 | 0.110 | 0.21 | 4656.961 | Fe II(43)4656.974(1) |
| 4657.194 | 43.2 | 0.163 | 0.25 | 4657.191 | Ti II(59)4657.212(9) |
| 4657.591 | 4.3 | 0.022 | 0.18 | 4657.588 | Fe I(346)4637.5848((1)) |
| 4660.412 | 6.4 | 0.020 | 0.30 | 4660.409 | Fe I (n) 4660.4315 (?) |
| 4660.881 | 4.9 | 0.019 | 0.24 | 4660.878 | (Fe II(146)4660.93(p)) |
| 4661.527 | 7.1 | 0.037 | 0.18 | 4661.524 | Fe I(n)4661.5344((2n)) |
| 4661.961 | 11.5 | 0.045 | 0.24 | 4661.958 | Fe I(409)4661.9703((2)) |

4685 Å Region

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| 4651.289 | 25.4 | 0.110 | 0.22 | 4651.286 | Cr I(21)4651.285(75) |
| 4652.164 | 43.4 | 0.195 | 0.21 | 4652.161 | Cr I(21)4652.155(100) |
| 4654.577 | 93.7 | 0.325 | 0.27 | 4654.574 | Fe I(39)4654.4983(5),Fe I(554,821) 4654.6050;.6286(5) |
| 4655.714 | 10.9 | 0.030 | 0.34 | 4655.710 | (Ti II(38)4655.75(p)) |
| 4656.175 | 4.6 | 0.017 | 0.25 | 4656.171 | Cr I(147)4656.183(30) |

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| 4593.936 | 12.9 | 0.036 | 0.33 | 4593.931 | Ce II(6)4593.93(840) |
| 4594.904 | 4.2 | 0.025 | 0.16 | 4594.899 | Ni I(-)4594.908((5n)) |
| 4595.363 | 21.8 | 0.101 | 0.20 | 4595.358 | Fe I(594)4595.3589(2n),(Sm II(45) 4595.291(250)) |
| 4595.619 | 12.1 | 0.043 | 0.26 | 4595.614 | Cr I(286)4595.599(45) |
| 4596.039 | 28.0 | 0.118 | 0.22 | 4596.034 | Fe I(820)4596.0605((2n)),Ni I(101) 4595.951(4n?) |
| 4597.330 | 6.5 | 0.024 | 0.25 | 4597.325 | |
| 4597.832 | 19.8 | 0.075 | 0.25 | 4597.827 | Gd II(44)4597.91(500) |
| 4598.125 | 29.9 | 0.134 | 0.21 | 4598.120 | Fe I(554)4598.1171((2n)) |
| 4599.851 | 19.1 | 0.087 | 0.21 | 4599.846 | Fe I (n) 4599.8425 (?) |
| 4600.126 | 10.6 | 0.051 | 0.20 | 4600.121 | Cr I(32)4600.109(40),V II(56) 4600.19(150) |
| 4600.353 | 23.2 | 0.101 | 0.21 | 4600.348 | Ni I(38)4600.372(6) |
| 4600.754 | 27.8 | 0.131 | 0.20 | 4600.749 | Cr I(21)4600.745(75r) |
| 4600.935 | 16.5 | 0.040 | 0.38 | 4600.930 | Cr I(32)4601.019(50),Fe I(591) 4600.9340((1)),Gd II(44)4601.05 (500) |
| 4601.363 | 5.6 | 0.034 | 0.15 | 4601.358 | Fe II(43)4601.34(p) |
| 4602.011 | 20.4 | 0.094 | 0.20 | 4602.006 | Fe I(39)4602.0010((2)) |
| 4602.950 | 68.8 | 0.298 | 0.22 | 4602.945 | Fe I(39)4602.9410(9) |
| 4604.561 | 10.0 | 0.051 | 0.18 | 4604.556 | Fe I (n) 4604.5575 (?) |
| 4604.993 | 35.0 | 0.155 | 0.21 | 4604.988 | Ni I(98)4604.994(12) |
| 4605.388 | 5.5 | 0.024 | 0.21 | 4605.383 | Mn I(-)4605.635(20) |
| 4605.598 | 9.9 | 0.055 | 0.17 | 4605.593 | |

4630 Å region

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| 4597.332 | 7.3 | 0.029 | 0.23 | 4597.329 | |
| 4597.816 | 21.2 | 0.075 | 0.27 | 4597.813 | |
| 4598.128 | 30.5 | 0.124 | 0.23 | 4598.125 | Fe I(554)4598.1171((2n)) |
| 4599.866 | 20.9 | 0.078 | 0.25 | 4599.863 | Fe I (n) 4599.8425 (?) |
| 4600.120 | 4.9 | 0.048 | 0.10 | 4600.117 | Cr I(32)4600.109(40),V II(56) 4600.19(150) |
| 4600.365 | 21.6 | 0.093 | 0.22 | 4600.362 | Ni I(38)4600.372(6) |
| 4600.763 | 36.1 | 0.148 | 0.23 | 4600.760 | Cr I(21)4600.745(75r) |
| 4601.036 | 9.3 | 0.038 | 0.23 | 4601.033 | Cr I(32)4601.019(50),Fe I(591) 4600.9340((1)),Gd II (44) 4601.05 (300) |
| 4601.366 | 8.1 | 0.035 | 0.22 | 4601.363 | Fe II(43)4601.34(p) |
| 4602.009 | 21.0 | 0.090 | 0.22 | 4602.006 | Fe I(39)4602.0010((2)) |
| 4602.954 | 68.9 | 0.288 | 0.22 | 4602.951 | Fe I(39)4602.9410(9) |
| 4604.583 | 11.0 | 0.045 | 0.23 | 4604.580 | Fe I(n) 4604.5575 (?) |
| 4604.993 | 36.2 | 0.151 | 0.22 | 4604.990 | Ni I(98)4604.994(12) |
| 4605.552 | 22.4 | 0.058 | 0.36 | 4605.549 | |
| 4606.255 | 14.9 | 0.047 | 0.30 | 4606.252 | Ni I(100)4606.231(3) |
| 4607.335 | 7.8 | 0.047 | 0.16 | 4607.332 | Sr I(2)4607.331(600R) |
| 4607.658 | 42.9 | 0.174 | 0.23 | 4607.655 | Fe I(554,n)4607.6469(3n) |
| 4609.254 | 3.1 | 0.028 | 0.11 | 4609.251 | Ti II(39)4009.26(p) |
| 4610.009 | 4.0 | 0.012 | 0.32 | 4610.006 | |
| 4611.284 | 61.9 | 0.233 | 0.25 | 4611.281 | Fe I(826)4611.2789(5n) |
| 4613.274 | 49.8 | 0.149 | 0.31 | 4613.271 | Fe I(554)4613.2027(2n),Cr I(21) 4613.36(60),La II(50)4613.38 (1200) |
| 4614.004 | 11.0 | 0.027 | 0.39 | 4614.001 | |
| 4615.613 | 8.8 | 0.031 | 0.27 | 4615.610 | Sm II(22)4615.690(470) |
| 4616.138 | 36.7 | 0.155 | 0.22 | 4616.135 | Cr I(21)4616.120(75) |
| 4616.632 | 38.7 | 0.161 | 0.23 | 4616.629 | Cr II(44)4616.64(25) |
| 4617.273 | 16.9 | 0.072 | 0.22 | 4617.270 | Ti I(145)4617.269(30) |
| 4618.812 | 67.3 | 0.282 | 0.22 | 4618.809 | Cr II(44)4618.82(50) |
| 4619.295 | 42.4 | 0.175 | 0.23 | 4619.292 | Fe I(821)4619.2880(3n) |
| 4619.541 | 7.6 | 0.034 | 0.21 | 4619.538 | Cr I(81)4619.537(40) |
| 4620.523 | 45.4 | 0.194 | 0.22 | 4620.520 | Fe II(38)4620.513(3) |

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| 4554.041 | 140.6 | 0.560 | 0.24 | 4554.037 | Ba II(1)4554.053(1000R),Zr II(130) 4553.96(12) |
| 4554.392 | 10.8 | 0.023 | 0.45 | 4554.388 | Fe I(319)4554.4512((1)) |
| 4555.000 | 43.0 | 0.191 | 0.21 | 4554.996 | Cr II(44)4555.01(30) |
| 4555.497 | 16.9 | 0.070 | 0.23 | 4555.493 | Ti I(42)4555.486(30) |
| 4555.895 | 85.6 | 0.373 | 0.22 | 4555.891 | Fe II(37)4555.890(8) |
| 4556.129 | 60.6 | 0.257 | 0.22 | 4556.125 | Fe I(820)4556.1259(4n),Cr I (173)4556.17(40) |
| 4556.965 | 2.7 | 0.013 | 0.19 | 4556.960 | Fe I(638)4556.9250((1)) |
| 4557.293 | 9.0 | 0.038 | 0.22 | 4557.289 | |
| 4558.161 | 5.7 | 0.025 | 0.21 | 4558.157 | Fe I(894)4558.1054(1) |
| 4558.656 | 89.4 | 0.354 | 0.24 | 4558.651 | Cr II(44)4558.66(100) |
| 4560.122 | 17.6 | 0.049 | 0.34 | 4560.118 | Fe I(823)4560.0881((2)),(Ce II(MCS) 4560.28(650)) |
| 4560.929 | 7.3 | 0.027 | 0.25 | 4560.925 | |
| 4561.415 | 8.0 | 0.028 | 0.27 | 4561.411 | Fe I(n)4561.4143(2) |
| 4562.369 | 13.3 | 0.055 | 0.23 | 4562.365 | Ce II(1)4562.36(2100) |
| 4563.771 | 115.1 | 0.476 | 0.23 | 4563.767 | Ti II(50)4563.770(16),Cr I(172) 4563.657(25) |
| 4564.612 | 14.6 | 0.056 | 0.24 | 4564.607 | V II(56)4564.592(200) |
| 4564.832 | 4.6 | 0.023 | 0.19 | 4564.828 | Fe I(472)4564.8214((1)) |
| 4565.399 | 11.0 | 0.045 | 0.23 | 4565.395 | Fe I(641)4565.3102((2n)) |
| 4565.685 | 44.0 | 0.131 | 0.31 | 4565.681 | Fe I(554)4565.6619(2),Cr II(39) 4565.77(10),Cr I(K)4565.512(50) |
| 4566.526 | 10.5 | 0.042 | 0.24 | 4566.521 | Fe I(641)4566.5145((2)) |
| 4566.880 | 16.0 | 0.067 | 0.22 | 4566.875 | |
| 4568.336 | 14.4 | 0.067 | 0.20 | 4568.332 | Ti II(60)4568.310(7) |
| 4568.787 | 13.8 | 0.048 | 0.27 | 4568.783 | Fe I(554)4568.7632((1)) |
| 4569.568 | 7.4 | 0.027 | 0.26 | 4569.563 | Cr I(173)4569.63(30) |
| 4571.100 | 28.2 | 0.125 | 0.21 | 4571.096 | Mg I(1)4571.096(5),(Cr I(125) 4571.103(25)) |
| 4571.846 | 34.6 | 0.061 | 0.53 | 4571.842 | |
| 4571.985 | 106.3 | 0.467 | 0.21 | 4571.980 | Ti II(82)4571.971(19) |
| 4572.242 | 12.7 | 0.045 | 0.26 | 4572.238 | Ce II(1)4572.28(1100) |
| 4574.224 | 5.2 | 0.029 | 0.17 | 4574.220 | Fe I(554)4574.2162((1)) |
| 4574.749 | 15.2 | 0.056 | 0.26 | 4574.745 | Fe I(115)4574.7179((2)) |
| 4576.342 | 59.0 | 0.273 | 0.20 | 4576.337 | Fe II(38)4576.331(4) |
| 4578.564 | 39.5 | 0.179 | 0.21 | 4578.559 | Ca I(23)4578.558(30) |
| 4580.057 | 37.0 | 0.164 | 0.21 | 4580.052 | Fe II(26)4580.055(1),Cr I(10) 4580.045(75) |
| 4580.503 | 15.4 | 0.055 | 0.26 | 4580.498 | Ti II(60)4580.449(6) |
| 4581.448 | 84.9 | 0.292 | 0.27 | 4581.443 | Ca I(23)4581.402(40),Fe I(555) 4581.5080((2)) |
| 4582.370 | 5.4 | 0.021 | 0.24 | 4582.365 | (Gd II(82)4582.38(300)) |
| 4582.839 | 49.4 | 0.217 | 0.21 | 4582.834 | Fe II(37)4582.835(3) |
| 4583.418 | 15.5 | 0.076 | 0.19 | 4583.413 | Ti II(39)4583.408(7) |
| 4583.849 | 123.4 | 0.464 | 0.25 | 4583.844 | Fe II(38)4583.829(11),Cr I(125) 4583.89(15) |
| 4584.799 | 21.5 | 0.089 | 0.23 | 4584.794 | Fe I(822)4584.8192((2)) |
| 4585.885 | 68.0 | 0.281 | 0.23 | 4585.880 | Ca I(23,23)4585.871,.923(50,(2)) |
| 4586.214 | 18.7 | 0.055 | 0.32 | 4586.209 | (Cr I(172)4586.138(20)) |
| 4587.133 | 16.6 | 0.077 | 0.20 | 4587.128 | Fe I(795)4587.1276((2)) |
| 4588.209 | 73.1 | 0.317 | 0.22 | 4588.204 | Cr II(44)4588.22(75) |
| 4589.958 | 75.0 | 0.324 | 0.22 | 4589.953 | Ti II(50)4589.915(15),Cr II(44) 4589.89(3) |
| 4590.790 | 3.5 | 0.034 | 0.10 | 4590.785 | Fe I (n) 4590.7897(?) |
| 4591.439 | 25.3 | 0.091 | 0.26 | 4591.434 | Cr I(21)4591.405(60),Fe I(-) 4591.502(2n) |
| 4592.063 | 44.8 | 0.188 | 0.22 | 4592.058 | Cr II(44)4592.07(25) |
| 4592.623 | 81.5 | 0.290 | 0.26 | 4592.618 | Fe I(39)4592.6511(5),Ni I(98) 4592.529 (10) |
| 4593.530 | 4.2 | 0.020 | 0.20 | 4593.525 | Fe I(n)4593.5252((1)),(Sm II(36) 4593.544(150)) |

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| 4539.763 | 9.2 | 0.051 | 0.17 | 4539.764 | Ce II(108)4539.75(840),Cr I(33) 4539.787(30) |
| 4540.482 | 13.9 | 0.068 | 0.19 | 4540.482 | Cr I(33)4540.50(50) |
| 4540.701 | 19.6 | 0.084 | 0.22 | 4540.702 | Cr I(150)4540.715(50) |
| 4541.123 | 5.2 | 0.016 | 0.31 | 4541.124 | Cr I(33)4541.066(30) |
| 4541.521 | 63.2 | 0.273 | 0.22 | 4541.521 | Fe II(38)4541.523(4),Cr I(149) 4541.506(25) |
| 4542.444 | 10.4 | 0.038 | 0.26 | 4542.444 | Fe I(894)4542.4121((2)) |
| 4542.671 | 8.5 | 0.026 | 0.30 | 4542.671 | Cr I(149,275)4542.64(35),Nd II (-)4542.60(340) |
| 4544.014 | 22.2 | 0.096 | 0.22 | 4544.015 | Ti II(60)4544.018(7),Sm II(32) 4543.948(250) |
| 4544.654 | 29.5 | 0.114 | 0.24 | 4544.654 | Ti I(42)4544.607(30),Cr I(33) 4544.619(50) |
| 4545.140 | 32.6 | 0.147 | 0.21 | 4545.141 | Ti II(30)4545.144(tr) |
| 4545.381 | 5.8 | 0.031 | 0.18 | 4545.381 | V I(109)4545.394(25),(Cr I(33) 4545.335(25)) |
| 4545.959 | 30.6 | 0.138 | 0.21 | 4545.959 | Cr I(10)4545.956(100) |
| 4546.965 | 24.4 | 0.097 | 0.24 | 4546.965 | Ni I(261)4546.930(5),Fe I(39) 4547.022((2)) |
| 4547.211 | 8.9 | 0.036 | 0.23 | 4547.211 | Ni I(146)4547.234(3) |
| 4547.854 | 48.3 | 0.219 | 0.21 | 4547.854 | Fe I(755)4547.8474(4) |
| 4548.772 | 17.6 | 0.091 | 0.18 | 4548.772 | Ti I(42)4548.764(35) |
| 4549.175 | 10.9 | 0.066 | 0.15 | 4549.175 | Fe II(186)4549.214(4) |
| 4549.527 | 163.9 | 0.476 | 0.32 | 4549.527 | Fe II(38)4549.467(10),Ti II(82) 4549.612(15) |
| 4549.705 | 100.8 | 0.272 | 0.35 | 4549.706 | Co I(150)4549.658(10) |
| 4550.210 | 2.0 | 0.012 | 0.16 | 4550.210 | |
| 4550.778 | 33.2 | 0.144 | 0.22 | 4550.778 | |
| 4551.236 | 5.1 | 0.018 | 0.26 | 4551.236 | Ni I(236)4551.236((3)) |
| 4551.658 | 3.5 | 0.024 | 0.14 | 4551.659 | Fe I(n)4551.6470((1)) |
| 4552.289 | 21.4 | 0.086 | 0.23 | 4552.290 | Ti II(30)4552.250(p) |
| 4552.506 | 33.3 | 0.146 | 0.22 | 4552.506 | Ti I(42)4552.453(35),Fe I(-) 4552.544((3)) |
| 4552.708 | 1.3 | 0.017 | 0.07 | 4552.708 | |

4575Å Region

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| 4541.522 | 58.7 | 0.260 | 0.21 | 4541.518 | Fe II(38)4541.523(4),Cr I(140) 4541.506(25) |
| 4542.403 | 5.7 | 0.034 | 0.16 | 4542.398 | Fe I(894)4542.4121((2)) |
| 4542.603 | 8.1 | 0.030 | 0.25 | 4542.599 | Nd II(-)4542.60(340),Cr I(149,275) 4542.64(35) |
| 4544.022 | 23.1 | 0.099 | 0.22 | 4544.018 | Ti II(60)4544.018(7),Sm II(32) 4543.948(250) |
| 4544.655 | 26.6 | 0.108 | 0.23 | 4544.650 | Cr I(33)4544.619(50),Ti I(42) 4544.607(30) |
| 4545.144 | 33.7 | 0.143 | 0.22 | 4545.140 | Ti II(30)4545.144(tr) |
| 4545.965 | 30.4 | 0.138 | 0.21 | 4545.960 | Cr I(10)4545.956(100) |
| 4546.969 | 24.6 | 0.103 | 0.22 | 4546.965 | Ni I(26)4546.930(5),Fe I(39) 4547.0169((2)) |
| 4547.243 | 7.3 | 0.035 | 0.20 | 4547.239 | Ni I(146)4547.234(3) |
| 4547.855 | 47.9 | 0.218 | 0.21 | 4547.851 | Fe I(755)4547.8474(4) |
| 4548.771 | 18.3 | 0.082 | 0.21 | 4548.767 | Ti I(42)4548.764(35) |
| 4549.188 | 10.8 | 0.071 | 0.14 | 4549.184 | Fe II(186)4549.214(4) |
| 4549.503 | 104.5 | 0.334 | 0.29 | 4549.499 | Fe II(38)4549.467(10),Ti II(82) 4549.612(15) |
| 4549.664 | 157.6 | 0.403 | 0.37 | 4549.660 | Co I(150)4549.658(10) |
| 4550.781 | 34.3 | 0.156 | 0.21 | 4550.776 | |
| 4552.283 | 16.8 | 0.070 | 0.23 | 4552.279 | Ti II(30)4552.25(p) |
| 4552.500 | 37.1 | 0.139 | 0.25 | 4552.496 | Ti I(42)4552.453(35),Fe I(-) 4552.544((3)) |

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| 4501.733 | 8.8 | 0.021 | 0.39 | 4501.733 | Cr I(81)4501.788(25) |
| 4502.216 | 13.3 | 0.061 | 0.20 | 4502.216 | Mn I(22)4502.223(30) |
| 4502.565 | 4.3 | 0.021 | 0.19 | 4502.565 | Fe I(796)4502.5909((1)) |
| 4504.812 | 9.4 | 0.041 | 0.22 | 4504.813 | Fe I(555)4504.8306((2)) |
| 4506.689 | 6.1 | 0.022 | 0.26 | 4506.689 | (Ca I(24)4506.624((1))),Ti II(30) 4506.740(p) |
| 4507.135 | 1.7 | 0.013 | 0.12 | 4507.135 | Fe II(213)4507.13(0n) |
| 4508.288 | 89.9 | 0.388 | 0.22 | 4508.289 | Fe II(38)4508.283(8) |
| 4509.734 | 8.5 | 0.042 | 0.19 | 4509.734 | |
| 4511.889 | 6.4 | 0.034 | 0.17 | 4511.890 | Cr I(150)4511.90(60) |
| 4512.747 | 14.8 | 0.063 | 0.22 | 4512.748 | Ti I(42)4512.734(40),V II(212) 4512.720(60n) |
| 4514.196 | 16.2 | 0.075 | 0.20 | 4514.196 | Fe I(514)4514.1839((2)) |
| 4514.448 | 15.9 | 0.077 | 0.19 | 4514.449 | (Cr I(287)4514.364(20)),Cr I(95) 4514.53(40wl) |
| 4515.343 | 84.5 | 0.359 | 0.22 | 4515.343 | Fe II(37)4515.337(7),(Cr I(26) 4515.440(25)) |
| 4516.644 | 3.4 | 0.013 | 0.24 | 4516.645 | |
| 4517.138 | 6.9 | 0.030 | 0.22 | 4517.139 | (Co I(150)4517.094(4)) |
| 4517.537 | 22.0 | 0.101 | 0.20 | 4517.538 | Fe I(472)4517.5245((2)) |
| 4518.021 | 19.3 | 0.096 | 0.19 | 4518.021 | Ti I(42)4518.022(50) |
| 4518.343 | 34.0 | 0.134 | 0.24 | 4518.343 | Ti II(18)4518.348(6) |
| 4520.228 | 83.1 | 0.350 | 0.22 | 4520.229 | Fe II(37)4520.225(7),Fe I(471) 4520.240(2) |
| 4521.112 | 2.2 | 0.016 | 0.13 | 4521.112 | Cr I(277,287)4521.138(25) |
| 4522.644 | 85.3 | 0.347 | 0.23 | 4522.645 | Fe II(38)4522.634(9),Eu II(4) 4522.590(3000) |
| 4522.711 | 57.8 | 0.094 | 0.58 | 4522.711 | Ti I(42)4522.798(40) |
| 4523.396 | 9.3 | 0.039 | 0.22 | 4523.396 | Fe I(829)4523.3987((2)) |
| 4523.937 | 2.4 | 0.015 | 0.15 | 4523.938 | Sm II(41)4523.912(250) |
| 4524.714 | 12.8 | 0.047 | 0.26 | 4524.714 | Ti II(60)4524.701(6) |
| 4524.919 | 9.4 | 0.058 | 0.15 | 4524.919 | Ba II(3)4524.928(35) |
| 4525.144 | 71.5 | 0.291 | 0.23 | 4525.145 | Fe I(826)4525.1368(5n) |
| 4526.110 | 2.9 | 0.019 | 0.14 | 4526.110 | Cr I(196)4526.090(40),La II(150) 4526.120(200) |
| 4526.464 | 52.5 | 0.197 | 0.25 | 4526.464 | Cr I(33)4526.458(75) |
| 4526.934 | 39.7 | 0.181 | 0.21 | 4526.935 | Ca I(36)4526.935(30) |
| 4527.337 | 25.2 | 0.107 | 0.22 | 4527.337 | Cr I(33,82)4527.335(40),Ti I(42) 4527.305(35),Ce II(109) 4527.35(840) |
| 4528.620 | 137.8 | 0.455 | 0.28 | 4528.621 | Fe I(68)4528.6142(18),V II(56) 4528.51(300),Ce II(MCS)4528.47 (840) |
| 4529.506 | 69.0 | 0.290 | 0.22 | 4529.506 | Ti II(82)4529.480(9) |
| 4529.701 | 17.4 | 0.068 | 0.24 | 4529.702 | |
| 4530.741 | 30.5 | 0.130 | 0.22 | 4530.742 | Cr I(33,33)4530.72(100) |
| 4530.938 | 9.5 | 0.063 | 0.14 | 4530.938 | Co I(150)4530.949(30) |
| 4531.150 | 74.9 | 0.323 | 0.22 | 4531.150 | Fe I(39)4531.1482(8) |
| 4531.621 | 17.3 | 0.074 | 0.22 | 4531.622 | Fe I(555,847)4531.6302((2)) |
| 4532.992 | 23.5 | 0.104 | 0.21 | 4532.993 | |
| 4533.246 | 59.3 | 0.258 | 0.22 | 4533.247 | Ti I(42)4533.238(80) |
| 4533.950 | 98.1 | 0.425 | 0.22 | 4533.951 | Ti II(50)4533.972(15) |
| 4534.129 | 74.1 | 0.255 | 0.27 | 4534.129 | Fe II(37)4534.166(2) |
| 4534.781 | 48.2 | 0.207 | 0.22 | 4534.781 | Ti I(42)4534.782(60) |
| 4535.165 | 6.9 | 0.028 | 0.24 | 4535.166 | Cr I(33)4535.14(35) |
| 4535.611 | 58.8 | 0.213 | 0.26 | 4535.611 | Ti I(42)4535.574(50),Cr I(33,276) 4535.714(60) |
| 4535.968 | 58.6 | 0.194 | 0.28 | 4535.968 | Ti I(42)4535.920(40),Ti I(42) 4536.051(40) |
| 4538.823 | 10.1 | 0.035 | 0.27 | 4538.824 | Fe I(n)4538.8366((2)),Fe I(115) 4538.764((1)) |
| 4539.613 | 11.0 | 0.051 | 0.20 | 4539.613 | Cr II(39)4539.61(3) |

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| 4482.745 | 31.5 | 0.120 | 0.25 | 4482.744 | Fe I(828)4482.7393((2)),(Ti I(113) 4482.688(10)) |
| 4483.873 | 7.5 | 0.032 | 0.22 | 4483.872 | Ce II(3)4483.90(700) |
| 4484.224 | 56.0 | 0.246 | 0.21 | 4484.223 | Fe I(828)4484.2198(4) |
| 4485.674 | 34.6 | 0.160 | 0.20 | 4485.673 | Fe I(830)4485.6756((2)) |
| 4485.924 | 2.5 | 0.014 | 0.17 | 4485.923 | (Fe I(825)4485.9725(p)) |
| 4486.903 | 4.6 | 0.042 | 0.10 | 4486.902 | Ce II(57)4486.91(840) |
| 4488.122 | 14.8 | 0.070 | 0.20 | 4488.121 | Fe I(819)4488.1331((2n)) |
| 4488.328 | 43.2 | 0.201 | 0.20 | 4488.327 | Ti II(115)4488.342(17) |
| 4488.906 | 8.5 | 0.050 | 0.16 | 4488.905 | V I(86,110)4488.898(20),Fe I (213)4488.9069((2)) |
| 4489.174 | 71.1 | 0.296 | 0.23 | 4489.173 | Ti I(146)4489.089(20),Fe II(37) 4489.185(4) |
| 4489.744 | 40.4 | 0.175 | 0.22 | 4489.743 | Fe I(2)4489.7391(3) |
| 4490.086 | 34.2 | 0.154 | 0.21 | 4490.085 | Fe I(469)4490.0840((2)),Mn I(22) 4490.078(30) |
| 4490.576 | 4.2 | 0.024 | 0.16 | 4490.575 | Ni I(134,235)4490.541((3)) |
| 4490.774 | 27.3 | 0.129 | 0.20 | 4490.773 | Fe I(n)4490.7601((2n)) |
| 4491.409 | 71.7 | 0.311 | 0.22 | 4491.408 | Fe II(37)4491.401(5) |
| 4492.344 | 4.7 | 0.019 | 0.23 | 4492.343 | Cr I(197)4492.31(40) |
| 4492.667 | 5.4 | 0.033 | 0.15 | 4492.666 | Fe I(n)4492.6783((1n)) |
| 4493.519 | 18.5 | 0.084 | 0.21 | 4493.518 | Ti II(18)4493.529(5),Fe II(222) 4493.579(1n) |
| 4494.062 | 18.5 | 0.045 | 0.39 | 4494.061 | (Fe I(n)4494.0555(p)) |
| 4494.567 | 94.5 | 0.379 | 0.23 | 4494.566 | Fe I(68,827)4494.5632;.5680(12) |
| 4495.479 | 11.3 | 0.039 | 0.27 | 4495.478 | (Ti II(40)4495.46(p)) |
| 4495.952 | 11.3 | 0.052 | 0.20 | 4495.951 | Fe I(825)4495.9531((1)) |
| 4496.163 | 11.1 | 0.047 | 0.22 | 4496.162 | Ti I(146)4496.146(20) |
| 4496.894 | 56.9 | 0.223 | 0.24 | 4496.893 | Cr I(10)4496.85(100),Zr II(40) 4496.960(15) |

4520 Å Region

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| 4487.809 | 3.2 | 0.017 | 0.18 | 4487.810 | (Fe I(594)4487.7364(*)) |
| 4488.150 | 20.7 | 0.078 | 0.25 | 4488.150 | Fe I(819)4488.1331((2n)) |
| 4488.338 | 40.2 | 0.195 | 0.19 | 4488.338 | Ti II(155)4488.342(17) |
| 4488.916 | 8.3 | 0.051 | 0.15 | 4488.917 | Fe I(827)4488.9069((2)),V I (86,110)4488.898(20) |
| 4489.177 | 69.2 | 0.295 | 0.22 | 4489.177 | Fe II(37)4489.185(4),Ti I(146) 4489.089(20) |
| 4489.747 | 39.9 | 0.188 | 0.20 | 4489.748 | Fe I(2)4489.7391(3) |
| 4490.089 | 33.5 | 0.165 | 0.19 | 4490.089 | Fe I(469)4490.0840((2)),Mn I(22) 4490.078(30) |
| 4490.771 | 29.1 | 0.129 | 0.21 | 4490.771 | Fe I(n)4490.7601((2n)) |
| 4491.407 | 72.8 | 0.318 | 0.21 | 4491.408 | Fe II(37)4491.401(5) |
| 4492.328 | 2.7 | 0.021 | 0.12 | 4492.329 | Cr I(197)4492.31(40) |
| 4492.680 | 7.1 | 0.036 | 0.18 | 4492.681 | Fe I(n)4492.6783((1n)) |
| 4493.522 | 17.4 | 0.090 | 0.18 | 4493.522 | Ti II(18)4493.529(5),Fe I((222) 4493.579(1n) |
| 4494.047 | 14.2 | 0.035 | 0.38 | 4494.047 | (Fe I(973)4495.05(p) |
| 4494.564 | 95.4 | 0.395 | 0.23 | 4494.564 | Fe I(68,827)4494.5632;5680(12) |
| 4495.471 | 12.1 | 0.039 | 0.29 | 4495.472 | (Ti II(40)4495.46(p)) |
| 4495.742 | 2.0 | 0.008 | 0.25 | 4495.743 | |
| 4495.913 | 6.5 | 0.039 | 0.16 | 4495.914 | Fe I(825)4495.9531((1)) |
| 4496.108 | 17.5 | 0.050 | 0.33 | 4496.108 | Ti I(146)4496.146(20) |
| 4497.737 | 5.9 | 0.020 | 0.27 | 4497.737 | |
| 4498.880 | 19.7 | 0.063 | 0.30 | 4498.880 | Mn I(22)4498.897(20) |
| 4499.151 | 10.4 | 0.055 | 0.18 | 4499.151 | |
| 4500.332 | 11.7 | 0.053 | 0.21 | 4500.333 | Cr I(150)4500.29(40),(Ti II(18) 4500.369(5)) |
| 4500.611 | 2.4 | 0.016 | 0.15 | 4500.611 | |
| 4501.274 | 125.7 | 0.498 | 0.24 | 4501.274 | Ti II(31)4501.269(15),(Cr I(81) 4501.10(35)) |

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| 4458.238 | 24.2 | 0.114 | 0.20 | 4458.237 | Mn I(28)4458.263(25) |
| 4458.527 | 10.8 | 0.044 | 0.23 | 4458.526 | Sm II(7)4458.520(1000),Cr I(127) 4458.537(45) |
| 4459.094 | 110.3 | 0.440 | 0.24 | 4459.093 | Ni I(86)4459.037(20),Fe I(68) 4459.1176(10) |
| 4459.345 | 27.5 | 0.116 | 0.22 | 4459.344 | (Cr I(63)4459.379(18w)) |
| 4459.742 | 4.3 | 0.025 | 0.16 | 4459.741 | Cr I(127)4459.75(25),V I(21) 4459.760(30) |
| 4460.251 | 20.3 | 0.082 | 0.23 | 4460.250 | Ce II(2)4460.21(2400),V I(21) 4460.292(50) |
| 4461.149 | 33.5 | 0.116 | 0.27 | 4461.148 | Ce II(10)4461.138(50),Mn I(28) 4461.089(30),Fe I(471)4461.1967 ((2)),Zr II(67)4461.22(10) |
| 4461.424 | 19.7 | 0.081 | 0.23 | 4461.423 | (Fe II(26)4461.430(p)),Fe I(725) 4461.3729((1)) |
| 4461.660 | 75.7 | 0.344 | 0.21 | 4461.659 | Fe I(2)4461.6528(8) |
| 4461.999 | 62.0 | 0.242 | 0.24 | 4461.998 | Fe I(825,902)4461.9698((4)),Mn I (28)4462.033(150) |
| 4462.448 | 27.8 | 0.107 | 0.24 | 4462.447 | Ni I(86)4462.460(10) |
| 4463.016 | 9.1 | 0.030 | 0.28 | 4463.015 | Nd II(50)4462.99(740) |
| 4463.398 | 12.7 | 0.060 | 0.20 | 4463.397 | Ti I(160)4463.391(20),(Ce II(20) 4463.410(60)),Ni I(102)4463.422 ((3)) |
| 4464.448 | 63.8 | 0.289 | 0.21 | 4464.447 | Ti II(40)4464.461(11) |
| 4464.708 | 45.9 | 0.160 | 0.27 | 4464.707 | Mn I(22)4464.679(80),Fe I(472) 4464.7665((2)),Cr I(127) 4464.66(25) |
| 4465.360 | 2.5 | 0.011 | 0.20 | 4465.359 | Cr I(127)4465.367(35) |
| 4465.797 | 5.0 | 0.032 | 0.15 | 4465.796 | Cr II(191)4465.77(5),Ti I(146) 4465.807(20) |
| 4466.554 | 90.8 | 0.372 | 0.23 | 4466.553 | Fe I(350)4466.5518(12),Gd II(44) 4466.547(500) |
| 4466.928 | 13.5 | 0.063 | 0.20 | 4466.927 | Fe I(n)4466.9386((2)) |
| 4467.355 | 4.0 | 0.016 | 0.23 | 4467.354 | Sm II(53)4467.342(2200) |
| 4468.500 | 124.4 | 0.502 | 0.23 | 4468.499 | Ti II(31)4468.517(19) |
| 4469.153 | 30.0 | 0.146 | 0.19 | 4469.152 | Ti II(18)4469.116(6) |
| 4469.375 | 67.4 | 0.298 | 0.21 | 4469.374 | Fe I(830)4469.3756(5n) |
| 4469.581 | 6.7 | 0.032 | 0.20 | 4469.580 | Co I(150)4469.547(15) |
| 4470.147 | 9.6 | 0.047 | 0.19 | 4470.146 | Mn I(22)4470.142(60) |
| 4470.479 | 34.8 | 0.163 | 0.20 | 4470.478 | Ni I(86)4470.483(15) |
| 4470.853 | 47.2 | 0.215 | 0.21 | 4470.852 | Ti II(40)4470.835(11) |
| 4471.254 | 14.2 | 0.055 | 0.24 | 4471.253 | Ce II(8)4471.24(1400),Ti I(146) 4471.238(20) |
| 4472.721 | 17.7 | 0.083 | 0.20 | 4472.720 | Fe I(900)4472.7113((2)),Mn I(22) 4472.793(100) |
| 4472.920 | 39.1 | 0.165 | 0.22 | 4472.919 | Fe II(37)4472.921(2) |
| 4474.755 | 9.5 | 0.023 | 0.39 | 4474.754 | V I(101)4474.714(12) |
| 4476.047 | 110.2 | 0.437 | 0.24 | 4476.046 | Fe I(350)4476.0186(10),Fe I(830) 4476.0755((4)) |
| 4477.438 | 5.4 | 0.020 | 0.26 | 4477.437 | |
| 4478.341 | 3.1 | 0.016 | 0.18 | 4478.340 | (Co I(150)4478.319(4)) |
| 4478.646 | 8.3 | 0.036 | 0.21 | 4478.645 | (Sm II(-)4478.657(125)) |
| 4478.886 | 3.9 | 0.020 | 0.18 | 4478.885 | |
| 4479.464 | 15.6 | 0.045 | 0.33 | 4479.463 | Ce II(124)4479.436(700) |
| 4479.639 | 18.3 | 0.095 | 0.18 | 4479.638 | Fe I(848*)4479.6028((3)) |
| 4479.915 | 2.7 | 0.019 | 0.13 | 4479.914 | (Fe I(n)4479.9629(p)) |
| 4480.112 | 41.3 | 0.113 | 0.34 | 4480.111 | Fe I(515)4480.1366((3)) |
| 4480.752 | 34.8 | 0.068 | 0.48 | 4480.751 | Fe II(-)4480.687(1) |
| 4481.171 | 151.0 | 0.451 | 0.31 | 4481.170 | Mg II(4)4481.129(100) |
| 4481.354 | 31.2 | 0.178 | 0.16 | 4481.353 | Mg II(4)4481.327(100) |
| 4481.546 | 44.8 | 0.113 | 0.37 | 4481.545 | Fe I(827)4481.6093((2)) |
| 4482.220 | 123.6 | 0.464 | 0.25 | 4482.219 | Fe I(2)4482.1699(4),Fe I(68) 4482.2527(6) |

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| | | | | | 4434.003 (15) |
| 4434.397 | 6.6 | 0.035 | 0.18 | 4434.396 | Sm II(36)4434.323(1800) |
| 4434.958 | 99.1 | 0.434 | 0.21 | 4434.957 | Ca I(4)4434.960(60r) |
| 4435.149 | 23.7 | 0.116 | 0.19 | 4435.148 | Fe I(2)4435.1489(2) |
| 4435.677 | 79.3 | 0.347 | 0.21 | 4435.676 | Ca I(4)4435.688(40) |
| 4436.346 | 13.2 | 0.061 | 0.20 | 4436.345 | Mn I(22)4436.358(80) |
| 4436.945 | 21.1 | 0.095 | 0.21 | 4436.944 | Fe I(516)4436.9206((2)),Ni I(86) 4436.981(5) |
| 4437.609 | 6.4 | 0.022 | 0.27 | 4437.608 | Ni I(168)4437.570(2) |
| 4438.338 | 15.3 | 0.067 | 0.21 | 4438.337 | Fe I(828)4438.3433((2)) |
| 4439.251 | 2.5 | 0.010 | 0.24 | 4439.250 | |
| 4439.877 | 8.0 | 0.038 | 0.20 | 4439.876 | Fe I(116)4439.8808((2)) |
| 4440.459 | 13.6 | 0.061 | 0.21 | 4440.458 | Zr II(79)4400.45(10),Fe I(829) 4440.4793((1)) |
| 4440.847 | 11.6 | 0.047 | 0.23 | 4440.846 | Fe I(n)4440.8239((1)) |
| 4441.090 | 6.9 | 0.038 | 0.17 | 4441.089 | Fe I(645)4440.9689((2)) |
| 4441.734 | 40.0 | 0.182 | 0.21 | 4441.733 | Ti II(40)4441.731(10),V I(21) 4441.683(25) |
| 4442.348 | 88.6 | 0.376 | 0.22 | 4442.347 | Fe I(68)4442.3390(12),Cr I(102) 4442.277(30) |
| 4442.902 | 29.2 | 0.093 | 0.29 | 4442.901 | Fe I(69)4442.8316((2)) |
| 4443.201 | 66.2 | 0.297 | 0.21 | 4443.200 | Fe I(350,474)4443.1942(7) |
| 4443.810 | 123.8 | 0.507 | 0.23 | 4443.809 | Ti II(19)4443.775(16),Cr I(234) 4443.719(30) |
| 4444.560 | 48.8 | 0.204 | 0.22 | 4444.564 | Fe II(201)4444.563(1),Ti II(31) 4444.536(10) |
| 4445.499 | 3.0 | 0.012 | 0.23 | 4445.498 | Fe I(2)4445.4715(2) |
| 4446.353 | 6.7 | 0.025 | 0.25 | 4446.352 | Nd II(49)4446.387(200) |
| 4446.840 | 24.2 | 0.110 | 0.21 | 4446.839 | Fe I(828)4446.8321((2)) |
| 4447.132 | 21.2 | 0.084 | 0.24 | 4447.131 | Fe I(69)4447.1304((2)) |
| 4447.729 | 87.7 | 0.369 | 0.22 | 4447.728 | Fe I(68)4447.7173(9) |
| 4449.172 | 20.0 | 0.075 | 0.25 | 4449.171 | Ti I(160)4449.143(30) |
| 4449.381 | 3.7 | 0.022 | 0.15 | 4449.380 | Ce II(202)4449.34(770) |
| 4450.477 | 98.9 | 0.369 | 0.25 | 4450.476 | Ti II(19)4450.503(15) |
| 4450.861 | 15.2 | 0.064 | 0.22 | 4450.860 | Ti I(160)4450.896(25),Ce II(MCS) 4450.73(620) |
| 4451.580 | 46.6 | 0.203 | 0.22 | 4451.579 | Nd II(50)4451.57(1400),Mn I(22) 4451.575(100),Fe II(J) 4451.545 (4) |
| 4452.690 | 6.3 | 0.023 | 0.25 | 4452.689 | Sm II(26)4452.727(250) |
| 4453.012 | 7.7 | 0.037 | 0.20 | 4453.011 | Mn I(22)4453.013(50) |
| 4453.313 | 18.9 | 0.079 | 0.22 | 4453.312 | Ti I(113)4453.312(30),V II(199) 4453.35(30n),Fe I(555)4453.325 (2) |
| 4453.705 | 5.5 | 0.032 | 0.16 | 4453.704 | Ti I(160)4453.708(20) |
| 4454.393 | 58.9 | 0.252 | 0.22 | 4454.392 | Fe I(350)4454.3810(5) |
| 4454.776 | 123.7 | 0.482 | 0.24 | 4454.775 | Ca I(4)4454.781(80),Zr II(40) 4454.80(10) |
| 4455.026 | 34.2 | 0.149 | 0.22 | 4455.025 | Mn I(28)4455.019(25),Fe I(n) 4455.0273((2)) |
| 4455.310 | 32.5 | 0.138 | 0.22 | 4455.309 | Mn I(28)4455.320(25),Fe II(J) 4455.258(3),Ti I(113)4455.321 (30) |
| 4455.885 | 86.2 | 0.348 | 0.23 | 4455.884 | Ca I(4)4455.887(40),Mn I(28) 4455.820(25) |
| 4456.334 | 18.2 | 0.068 | 0.25 | 4456.333 | Fe I(516)4456.3257((1)) |
| 4456.631 | 28.2 | 0.127 | 0.21 | 4456.630 | Ca I(4)4456.612(10),(Ti II(115) 4456.632(8)) |
| 4457.042 | 5.6 | 0.029 | 0.18 | 4457.041 | Mn I(28)4457.041(20) |
| 4457.477 | 44.4 | 0.154 | 0.27 | 4457.476 | Ti I(113)4457.428(40),Zr II(79) 4457.42 (9),V I(21)4457.479 (15),Mn I(28)4457.533(20) |
| 4458.074 | 21.3 | 0.107 | 0.19 | 4458.073 | Fe I(n)4458.0802((3)) |

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| | | | | | 4422.583(1495) |
| 4422.959 | 5.1 | 0.024 | 0.20 | 4422.952 | Fe I(646)4422.882((1n)),Ni I(168) 4423.00((3)),Ti I(78) 4422.823(10) |
| 4423.193 | 19.3 | 0.068 | 0.27 | 4423.186 | Fe I(412)4423.1415((1)) |
| 4423.838 | 17.6 | 0.069 | 0.24 | 4423.831 | Fe I(830)4423.8408((2 *1*)) |
| 4424.274 | 19.8 | 0.056 | 0.34 | 4424.267 | Cr I(129)4424.293(40),Fe I(757) 4424.1879((1)),Sm II(45)4424.34 (2900) |
| 4424.625 | 2.5 | 0.012 | 0.19 | 4424.618 | |
| 4425.442 | 88.5 | 0.354 | 0.23 | 4425.435 | Ca I(4)4425.441(50) |
| 4425.746 | 10.0 | 0.039 | 0.24 | 4425.739 | Fe I(796)4425.6563((1)) |
| 4426.037 | 3.9 | 0.023 | 0.16 | 4426.030 | Ti I(161)4426.054(10),V I(22) 4426.005(20) |
| 4427.074 | 14.5 | 0.077 | 0.18 | 4427.067 | Ti I(128)4427.098(40) |
| 4427.310 | 91.1 | 0.361 | 0.24 | 4427.303 | Fe I(2)4427.3099(10) |
| 4427.913 | 7.6 | 0.027 | 0.27 | 4427.906 | Mg II(9)4427.995(7) |
| 4428.553 | 7.8 | 0.031 | 0.23 | 4428.546 | V I(21)4428.515(15),Cr I(129) 4428.52(35) |
| 4429.235 | 7.9 | 0.037 | 0.20 | 4429.228 | Ce II(19)4429.270(650) |
| 4429.902 | 13.4 | 0.062 | 0.20 | 4429.895 | (V I(22)4429.796(15)),La II(38) 4429.90(2000) |
| 4430.164 | 32.5 | 0.098 | 0.31 | 4430.157 | Fe I(472)4430.1891((2)) |
| 4430.624 | 74.1 | 0.284 | 0.25 | 4430.617 | Fe I(68)4430.6140(6) |
| 4431.356 | 12.7 | 0.057 | 0.21 | 4431.349 | Sc II(14)4431.369(3) |
| 4431.851 | 4.8 | 0.045 | 0.10 | 4431.844 | Mn I(40)4431.922((1)) |
| 4432.103 | 18.2 | 0.059 | 0.29 | 4432.096 | Ti II(51)4432.089(tr),Cr I(81) 4432.16(40) |
| 4432.567 | 14.2 | 0.065 | 0.21 | 4432.560 | Fe I(797)4432.5678((3)) |
| 4433.227 | 52.6 | 0.222 | 0.22 | 4433.220 | Fe I(830)4433.2187(3n) |
| 4433.783 | 27.5 | 0.134 | 0.19 | 4433.776 | Fe I(825)4433.7824((3n)),Sm II(41) 4433.88(1600) |
| 4433.960 | 12.6 | 0.047 | 0.25 | 4433.953 | Cr I(128)4433.969(20),Mg II(9) 4433.991(8),Ti I(113,161) 4434.003 (15) |
| 4434.390 | 11.7 | 0.043 | 0.25 | 4434.383 | Sm II(36)4434.323(1800) |
| 4434.674 | 5.3 | 0.026 | 0.19 | 4434.667 | (Cr I(128)4434.76(10)) |
| 4434.947 | 75.7 | 0.334 | 0.21 | 4434.940 | Ca I(4)4434.960(60r) |
| 4435.100 | 51.0 | 0.158 | 0.30 | 4435.093 | Fe I(2)4435.1489(2) |
| 4435.679 | 82.1 | 0.323 | 0.24 | 4435.672 | Ca I(4)4435.688(40) |
| 4436.340 | 19.5 | 0.068 | 0.27 | 4436.333 | Mn I(22)4436.358(80) |
| 4436.950 | 19.3 | 0.087 | 0.21 | 4436.943 | Fe I(516)4436.9206((2)),Ni I(86) 4436.981(5) |
| 4437.666 | 5.2 | 0.017 | 0.29 | 4437.659 | Ni I(168)4437.570(2) |
| 4438.346 | 13.4 | 0.061 | 0.21 | 4438.339 | Fe I(828)4438.3433((2)) |
| 4439.877 | 6.9 | 0.034 | 0.19 | 4439.870 | Fe I(116)4439.8808((2)) |
| 4440.463 | 16.1 | 0.049 | 0.31 | 4440.456 | Zr II(79)4440.45(10),Fe I(829) 4440.4793((1)) |
| 4440.988 | 11.0 | 0.036 | 0.28 | 4440.981 | Fe I(645)4440.9689((2)) |
| 4441.730 | 38.1 | 0.165 | 0.22 | 4441.723 | Ti II(40)4441.730(10),V I(21) 4441.683(25) |

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| 4431.831 | 11.2 | 0.045 | 0.23 | 4431.830 | Mn I(40)4431.922((1)) |
| 4432.134 | 15.3 | 0.061 | 0.23 | 4432.133 | Ti II(51)4432.089(tr),Cr I(81) 4432.175(40) |
| 4432.568 | 12.7 | 0.067 | 0.18 | 4432.567 | Fe I(797)4432.5678((3)) |
| 4433.220 | 53.1 | 0.234 | 0.21 | 4433.219 | Fe I(830)4433.2187(3n) |
| 4433.787 | 30.1 | 0.149 | 0.19 | 4433.786 | Fe I(825)4433.7824((3n)),Sm II(41) 4433.88(1600) |
| 4433.981 | 8.6 | 0.047 | 0.17 | 4433.980 | Cr I(128)4433.969(20),Mg II(9) 4433.991(8),Ti I(113,161) |

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| 4393.353 | 17.7 | 0.034 | 0.50 | 4393.346 | |
| 4393.752 | 6.9 | 0.023 | 0.28 | 4393.745 | (Fe I(899)4393.70(p)) |
| 4394.066 | 66.8 | 0.284 | 0.22 | 4394.059 | Ti II(51)4394.018(13) |
| 4395.045 | 135.0 | 0.500 | 0.25 | 4395.038 | Ti II(19)4395.004(19) |
| 4395.277 | 12.4 | 0.077 | 0.15 | 4395.270 | Fe I(828)4395.2741((2)),V I(22) 4395.228(80) |
| 4395.484 | 10.7 | 0.047 | 0.22 | 4395.477 | Fe I(n)4395.4973(1w),Cr I(129) 4395.417(18) |
| 4395.851 | 52.4 | 0.220 | 0.22 | 4395.844 | Ti II(61)4395.833(11) |
| 4398.020 | 25.4 | 0.129 | 0.18 | 4398.013 | Y II(5)4398.008(2048) |
| 4398.301 | 18.7 | 0.064 | 0.28 | 4398.294 | Ti II(61)4398.251(4) |
| 4398.744 | 5.1 | 0.016 | 0.30 | 4398.737 | Ni I(102)4398.625(3) |
| 4399.219 | 2.6 | 0.020 | 0.12 | 4399.212 | Ce II(81)4399.203(510) |
| 4399.769 | 92.3 | 0.378 | 0.23 | 4399.762 | Ti II(51)4399.786(15),(Ni I(196) 4399.607(3)),Cr I(129)4399.821 (30) |
| 4400.400 | 81.9 | 0.341 | 0.23 | 4400.393 | Sc II(14)4400.355(30) |
| 4400.645 | 6.0 | 0.041 | 0.14 | 4400.638 | V I(22)4400.575(60) |
| 4400.820 | 5.2 | 0.028 | 0.17 | 4400.813 | Ni I(149)4400.870(3) |
| 4401.007 | 20.2 | 0.071 | 0.27 | 4401.000 | |
| 4401.299 | 42.5 | 0.190 | 0.21 | 4401.292 | Fe I(828)4401.2899((5)) |
| 4401.534 | 72.8 | 0.290 | 0.24 | 4401.527 | Ni I(86)4401.547(30),Fe I(350) 4401.4429((2)) |
| 4403.180 | 14.1 | 0.049 | 0.27 | 4403.173 | |
| 4403.398 | 13.5 | 0.039 | 0.33 | 4403.391 | Cr I(128)4403.377(35),Cr I(-) 4403.513(40) |
| 4404.297 | 15.1 | 0.044 | 0.32 | 4404.290 | Ti I(218,219)4404.276(10) |
| 4404.763 | 179.8 | 0.567 | 0.30 | 4404.756 | Fe I(41)4404.7504(30) |
| 4406.642 | 6.6 | 0.035 | 0.18 | 4406.635 | Cr I(K)4406.67(20),V I(22) 4406.641(80),Gd II(103)4406.67 (400) |
| 4407.272 | 2.7 | 0.020 | 0.12 | 4407.265 | (Ce II(64)4407.278((40))),Fe I(827) 4407.2329(3) |
| 4407.700 | 66.4 | 0.286 | 0.22 | 4407.693 | V I(22)4407.637(70),Ti II(51) 4407.678(1),Fe I(68)4407.7092 (5),Cr I(129)4407.70(40d) |
| 4408.425 | 77.0 | 0.279 | 0.26 | 4408.418 | Fe I(68)4408.4135(6),(V I(22) 4408.511(90)) |
| 4409.240 | 25.9 | 0.076 | 0.32 | 4409.233 | Ti II(61)4409.244(5) |
| 4409.529 | 16.9 | 0.088 | 0.18 | 4409.522 | Ti II(61)4409.519(8) |
| 4410.535 | 10.6 | 0.041 | 0.24 | 4410.528 | Ni I(88)4410.516(4) |
| 4411.085 | 39.0 | 0.170 | 0.22 | 4411.078 | Ti II(115)4411.094(14),Cr I(129) 4411.105(40),Nd II(8)4411.052 (150) |
| 4411.933 | 22.4 | 0.107 | 0.20 | 4411.926 | Ti II(61)4411.922(5),Mn I(-) 4411.878(3) |
| 4412.210 | 4.6 | 0.018 | 0.24 | 4412.203 | Cr I(22)4412.251(40) |
| 4413.581 | 10.2 | 0.057 | 0.17 | 4413.574 | Fe II(32)4413.600(0) |
| 4413.716 | 7.8 | 0.025 | 0.29 | 4413.709 | (Cr I(234)4413.86(40)) |
| 4414.519 | 7.1 | 0.034 | 0.19 | 4414.512 | Zr II(79)4414.54(5) |
| 4414.886 | 20.5 | 0.093 | 0.21 | 4414.879 | Mn I(22)4414.887(40) |
| 4415.132 | 131.6 | 0.498 | 0.25 | 4415.125 | Fe I(41)4415.125(30) |
| 4415.556 | 75.2 | 0.312 | 0.23 | 4415.549 | Sc II(14)4415.559(20) |
| 4416.828 | 76.7 | 0.329 | 0.22 | 4416.821 | Fe II(27)4416.817(7) |
| 4417.282 | 6.6 | 0.024 | 0.26 | 4417.275 | Ti I(161)4417.274(15) |
| 4417.723 | 91.3 | 0.388 | 0.22 | 4417.716 | Ti II(40)4417.715(17) |
| 4418.339 | 52.1 | 0.232 | 0.21 | 4418.332 | Ti II(51)4418.306(11) |
| 4418.846 | 7.9 | 0.026 | 0.28 | 4418.839 | Ce II(2)4418.784(980) |
| 4419.768 | 3.5 | 0.014 | 0.23 | 4419.761 | (Fe I(644)4419.780(p)) |
| 4420.407 | 4.6 | 0.018 | 0.23 | 4420.400 | |
| 4420.657 | 5.6 | 0.029 | 0.18 | 4420.650 | Sc II(14)4420.665(2) |
| 4421.960 | 36.0 | 0.148 | 0.23 | 4421.953 | Ti II(93)4421.949(1) |
| 4422.571 | 68.7 | 0.288 | 0.22 | 4422.564 | Fe I(350)4422.5681(6),Y II(5) |

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| 4376.776 | 10.9 | 0.059 | 0.17 | 4376.771 | Fe I(471,904)4376.7742((1)),Cr I (304) 4376.803(25) |
| 4377.294 | 8.6 | 0.037 | 0.22 | 4377.289 | Fe I(990)4377.330((1)) |
| 4377.755 | 6.4 | 0.021 | 0.29 | 4377.750 | Fe I(645)4377.7916(1) |
| 4378.269 | 8.8 | 0.032 | 0.26 | 4378.264 | |
| 4379.239 | 27.4 | 0.133 | 0.19 | 4379.233 | V I(22)4379.238(150rw) |
| 4379.776 | 12.5 | 0.064 | 0.18 | 4379.771 | Zr II(88)4379.78(9) |
| 4380.064 | 3.9 | 0.021 | 0.18 | 4380.059 | |
| 4380.453 | 5.7 | 0.033 | 0.16 | 4380.448 | |
| 4380.707 | 11.5 | 0.040 | 0.27 | 4380.702 | |
| 4382.184 | 2.7 | 0.027 | 0.09 | 4382.179 | Ce II(2)4382.17(910)) |
| 4382.768 | 35.3 | 0.146 | 0.23 | 4382.763 | Fe I(799a*)4382.7680((2)) |
| 4383.104 | 19.1 | 0.055 | 0.32 | 4383.099 | |
| 4383.555 | 225.8 | 0.648 | 0.33 | 4383.550 | Fe I(41)4383.5450(45r) |
| 4384.316 | 50.2 | 0.161 | 0.29 | 4384.311 | Fe II(32)4384.330(p) |
| 4384.722 | 46.2 | 0.179 | 0.24 | 4384.717 | Mg II(10)4384.643(8),Fe I(474) 4384.6722((1)),V I(5,22) 4384.722(125r),Sc II(14) 4384.813(6) |
| 4384.967 | 41.9 | 0.120 | 0.33 | 4384.961 | Cr I(22)4384.974(75) |
| 4385.377 | 83.3 | 0.340 | 0.23 | 4385.372 | Fe II(27)4385.381(7) |
| 4385.640 | 3.5 | 0.018 | 0.18 | 4385.635 | Nd II(50)4385.66(710) |
| 4386.852 | 46.6 | 0.193 | 0.23 | 4386.847 | Ti II(104)4386.846(18),Ce II(MCS) 4386.84(700) |

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| 4378.278 | 4.9 | 0.025 | 0.18 | 4378.271 | |
| 4379.234 | 27.6 | 0.126 | 0.21 | 4379.227 | V I(22)4379.238(150rw) |
| 4379.768 | 13.9 | 0.062 | 0.21 | 4379.761 | Zr II(88)4379.78(9),Cr I(130) 4379.782(20) |
| 4380.081 | 7.0 | 0.033 | 0.20 | 4380.074 | |
| 4380.416 | 5.4 | 0.032 | 0.16 | 4380.409 | |
| 4380.584 | 3.6 | 0.030 | 0.11 | 4380.577 | Cr I(130)4380.55(10) |
| 4380.789 | 10.1 | 0.031 | 0.31 | 4380.782 | |
| 4381.126 | 3.1 | 0.026 | 0.11 | 4381.119 | Cr I(64)4381.113(35) |
| 4382.148 | 3.6 | 0.022 | 0.15 | 4382.141 | Ce II(2)4382.17(910) |
| 4382.779 | 31.0 | 0.137 | 0.21 | 4382.772 | Fe I(799a*)4382.7680((2)) |
| 4383.129 | 12.7 | 0.043 | 0.28 | 4383.122 | |
| 4383.558 | 219.5 | 0.641 | 0.32 | 4383.551 | Fe I(41)4383.5450(45r) |
| 4384.317 | 42.2 | 0.162 | 0.25 | 4384.310 | Fe II(32)4384.330(p) |
| 4384.721 | 45.1 | 0.157 | 0.27 | 4384.714 | Mg II(10)4384.643(8),Fe I(474) 4384.6722((1)),V I(5,22) 4384.722(125r),Sc II(14)4384.813 (6) |
| 4384.965 | 43.9 | 0.115 | 0.36 | 4384.958 | Cr I(22)4384.974(75) |
| 4385.383 | 80.8 | 0.333 | 0.23 | 4385.376 | Fe II(27)4385.381(7) |
| 4386.847 | 41.8 | 0.194 | 0.20 | 4386.840 | Ti II(104)4386.846(13),Ce II(MCS) 4386.84(700) |
| 4387.490 | 7.1 | 0.034 | 0.19 | 4387.483 | Cr I(103)4387.511(30) |
| 4387.905 | 34.8 | 0.159 | 0.21 | 4387.898 | Fe I(476)4387.8912(3) |
| 4388.414 | 54.9 | 0.249 | 0.21 | 4388.407 | Fe I(830)4388.4068(4n) |
| 4388.702 | 6.9 | 0.025 | 0.26 | 4388.695 | |
| 4389.255 | 9.1 | 0.056 | 0.15 | 4389.248 | Fe I(2)4389.2449(2) |
| 4389.978 | 18.1 | 0.069 | 0.25 | 4389.971 | V I(22)4389.974(100) |
| 4390.535 | 20.2 | 0.062 | 0.31 | 4390.528 | Mg II(10)4390.585(40),Fe I(413) 4390.4480((1)) |
| 4390.994 | 69.2 | 0.276 | 0.24 | 4390.987 | Ti II(61)4391.043(10),Fe I(414) 4390.9505(4),(Sm II(15)4390.862 (1600)) |
| 4391.692 | 21.7 | 0.069 | 0.30 | 4391.685 | Ce II(81)4391.66(1700),Cr I(22) 4391.755(40) |
| 4391.980 | 4.5 | 0.016 | 0.26 | 4391.973 | |
| 4392.592 | 6.9 | 0.029 | 0.22 | 4392.585 | Fe I(n)4392.5797((1)) |

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| | | | | | 4347.801(400) |
| 4348.351 | 4.5 | 0.021 | 0.20 | 4348.346 | |
| 4348.958 | 11.4 | 0.047 | 0.23 | 4348.953 | Fe I(414)4348.9366((1)) |
| 4349.785 | 4.3 | 0.017 | 0.24 | 4349.780 | Ce II(59)4349.79(700) |
| 4350.837 | 24.1 | 0.111 | 0.20 | 4350.832 | Ti II(94)4350.846(12) |
| 4351.058 | 25.5 | 0.114 | 0.21 | 4351.053 | Cr I(22)4351.055(75) |
| 4351.519 | 17.9 | 0.088 | 0.19 | 4351.514 | Fe I(413)4351.5439(3) |
| 4351.846 | 206.2 | 0.559 | 0.35 | 4351.841 | Fe I(413)4351.764(9),Cr I(22) 4351.77(100) |
| 4352.306 | 3.8 | 0.021 | 0.17 | 4352.301 | |
| 4352.743 | 75.0 | 0.319 | 0.22 | 4352.738 | Ce II(220)4352.71(560),Fe I(71) 4352.7347(9) |
| 4354.586 | 31.0 | 0.110 | 0.26 | 4354.581 | Sc II(14)4354.609(5) |
| 4355.098 | 37.1 | 0.165 | 0.21 | 4355.093 | Ca I(37)4355.096(25) |
| 4355.928 | 4.9 | 0.024 | 0.19 | 4355.923 | Ni I(149)4355.911(3) |
| 4357.556 | 5.0 | 0.027 | 0.17 | 4357.551 | Fe II(J)4357.574(4) |
| 4358.138 | 3.0 | 0.027 | 0.11 | 4358.133 | Nd II(10)4358.17(850) |
| 4358.505 | 28.0 | 0.124 | 0.21 | 4358.500 | Fe I(412)4358.4991(3) |
| 4358.739 | 26.7 | 0.097 | 0.26 | 4358.733 | Y II(5)4358.723(1143) |
| 4359.651 | 54.9 | 0.207 | 0.25 | 4359.646 | Cr I(22)4359.647(75),Ni I(86) 4359.585(10) |
| 4360.432 | 6.8 | 0.024 | 0.27 | 4360.427 | |
| 4360.779 | 8.7 | 0.049 | 0.16 | 4360.773 | Fe I(903)4360.8032((1)) |
| 4361.235 | 2.3 | 0.018 | 0.12 | 4361.229 | Fe II(J)4361.249(2) |
| 4362.118 | 10.4 | 0.044 | 0.22 | 4362.113 | Ni II(9)4362.10(1) |
| 4362.551 | 10.1 | 0.041 | 0.23 | 4362.545 | |
| 4362.779 | 2.2 | 0.021 | 0.09 | 4362.773 | |
| 4363.102 | 9.0 | 0.036 | 0.23 | 4363.097 | (La II(133)4363.05(50 *l*)),Cr I(103) 4363.132(30) |
| 4363.302 | 2.2 | 0.018 | 0.12 | 4363.296 | |
| 4363.566 | 4.2 | 0.013 | 0.31 | 4363.561 | |
| 4364.060 | 3.8 | 0.022 | 0.16 | 4364.055 | Y II(70)4364.003(20) |
| 4364.225 | 3.7 | 0.028 | 0.12 | 4364.220 | Y II(70)4364.193(14) |
| 4364.677 | 3.9 | 0.027 | 0.14 | 4364.671 | (La II(53)4364.66(100)),Ce II(135) 4364.66(910) |
| 4365.906 | 9.8 | 0.052 | 0.18 | 4365.900 | Fe I(415)4365.8967((1)) |
| 4366.410 | 3.2 | 0.013 | 0.23 | 4366.405 | |
| 4366.626 | 4.3 | 0.023 | 0.18 | 4366.621 | |
| 4367.622 | 90.9 | 0.366 | 0.23 | 4367.617 | Fe I(414)4367.5785(5),Ti II(104) 4367.654(16) |
| 4367.912 | 32.6 | 0.148 | 0.21 | 4367.907 | Fe I(41)4367.9036(2) |
| 4368.208 | 12.0 | 0.038 | 0.30 | 4368.203 | Cr I(130)4368.252(20),Fe II(-) 4368.262(1) |
| 4368.628 | 3.3 | 0.019 | 0.17 | 4368.623 | Nd II(11)4368.632(60) |
| 4369.411 | 30.9 | 0.144 | 0.20 | 4369.406 | Fe II(28)4369.404(2) |
| 4369.777 | 71.1 | 0.294 | 0.23 | 4369.771 | Fe I(518)4369.7718(7),Gd II(15) 4369.771(500) |
| 4370.989 | 14.8 | 0.066 | 0.21 | 4370.983 | Zr II(79)4370.96(8) |
| 4371.310 | 46.8 | 0.182 | 0.24 | 4371.305 | Cr I(22)4371.279(75) |
| 4372.274 | 2.5 | 0.015 | 0.16 | 4372.269 | |
| 4372.770 | 2.0 | 0.021 | 0.09 | 4372.765 | |
| 4372.962 | 5.1 | 0.020 | 0.24 | 4372.957 | Fe I(473)4372.9817((1)) |
| 4373.257 | 2.3 | 0.025 | 0.09 | 4373.251 | Cr I(22)4373.255(35) |
| 4373.566 | 20.1 | 0.105 | 0.18 | 4373.561 | Fe I(413)4373.5607((2)) |
| 4373.759 | 7.6 | 0.024 | 0.29 | 4373.753 | |
| 4374.169 | 19.5 | 0.086 | 0.21 | 4374.164 | Cr I(104)4374.166(40) |
| 4374.470 | 83.6 | 0.370 | 0.21 | 4374.465 | Sc II(14)4374.455(40),Fe I(648) 4374.4892((1)) |
| 4374.910 | 108.2 | 0.386 | 0.26 | 4374.905 | Y II(13)4374.933(6300s),Mn I(C) 4374.952(50) |
| 4375.351 | 11.2 | 0.037 | 0.29 | 4375.346 | Cr I(103)4375.338(30) |
| 4375.940 | 84.3 | 0.373 | 0.21 | 4375.935 | Fe I(2)4375.9301(9),Ce II(MCS) 4375.92(530) |

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| | | | | | 4325.075(40),Ti I(235)4325.134 (9n) |
| 4325.337 | 27.7 | 0.062 | 0.42 | 4325.335 | Ni I(116)4325.361(2) |
| 4325.774 | 183.3 | 0.594 | 0.29 | 4325.772 | Nd II(10)4325.76(1100),Fe I(2,42) 4325.7620;.7619(35) |
| 4326.018 | 12.1 | 0.065 | 0.18 | 4326.017 | |
| 4326.255 | 13.9 | 0.026 | 0.51 | 4326.253 | |
| 4326.762 | 25.8 | 0.101 | 0.24 | 4326.761 | Fe I(413)4326.7533((2)) |
| 4327.107 | 40.9 | 0.185 | 0.21 | 4327.105 | Fe I(761)4327.0956(3),Gd II(15) 4327.125(1500) |
| 4327.916 | 20.1 | 0.085 | 0.22 | 4327.915 | Fe I(597)4327.9034((2)) |
| 4330.257 | 29.4 | 0.125 | 0.22 | 4330.255 | Ti II(94)4330.234(12) |
| 4330.706 | 43.3 | 0.199 | 0.20 | 4330.705 | Ti II(41)4330.723(11) |
| 4330.945 | 8.6 | 0.030 | 0.27 | 4330.943 | Fe I(597)4330.9516((1)) |
| 4331.649 | 17.4 | 0.075 | 0.22 | 4331.647 | Ni I(52)4331.645(12) |
| 4333.777 | 17.6 | 0.085 | 0.19 | 4333.775 | La II(24)4333.74(4600) |

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| 4322.508 | 4.6 | 0.023 | 0.19 | 4322.502 | La II(25)4322.51(440) |
| 4323.000 | 2.6 | 0.025 | 0.10 | 4322.995 | |
| 4323.175 | 11.9 | 0.044 | 0.25 | 4323.169 | |
| 4323.484 | 17.7 | 0.039 | 0.43 | 4323.479 | Cr I(-)4323.521(30) |
| 4323.920 | 10.5 | 0.037 | 0.27 | 4323.915 | |
| 4325.016 | 86.0 | 0.372 | 0.22 | 4325.011 | Sc II(15)4325.010(40),Fe I(70) 4324.9486((1)),Cr I(104)4325.075 (40),Ti I(235)4325.134(9n) |
| 4325.366 | 12.2 | 0.042 | 0.28 | 4325.361 | Ni I(116)4325.316(2) |
| 4325.783 | 197.3 | 0.588 | 0.32 | 4325.778 | Fe I(2,42)4325.762;.7619 (35) NdII(10) 4325.76(1100) |
| 4326.764 | 22.7 | 0.097 | 0.22 | 4326.759 | Fe I(413)4326.7533((2)) |
| 4327.109 | 40.2 | 0.193 | 0.20 | 4327.104 | Fe I(761)4327.0956(3),Gd II(15) 4327.125(1500) |
| 4327.927 | 18.0 | 0.081 | 0.21 | 4327.921 | Fe I(597)4327.9034((2)) |
| 4330.264 | 31.9 | 0.130 | 0.23 | 4330.259 | Ti II(94)4330.234(12) |
| 4330.709 | 48.4 | 0.208 | 0.22 | 4330.704 | Ti II(41)4330.723(11) |
| 4330.979 | 7.1 | 0.039 | 0.17 | 4330.974 | Fe I(597)4330.9519(1)) |
| 4331.644 | 18.4 | 0.074 | 0.24 | 4331.639 | Ni I(52)4331.645(12) |
| 4332.588 | 4.1 | 0.017 | 0.22 | 4332.583 | Cr I(176)4332.574(15) |
| 4332.908 | 6.1 | 0.026 | 0.22 | 4332.903 | (Fe II(33)4332.88(p)) |
| 4333.255 | 3.4 | 0.013 | 0.24 | 4333.250 | Zr II(132)4333.28(15) |
| 4333.761 | 19.5 | 0.088 | 0.21 | 4333.756 | La II(24)4333.74(4600) |
| 4334.015 | 8.2 | 0.020 | 0.39 | 4334.010 | |
| 4337.058 | 66.1 | 0.286 | 0.22 | 4337.053 | Fe I(41)4337.0463(10) |
| 4337.283 | 5.6 | 0.046 | 0.11 | 4337.278 | Ti II(94)4337.254(4) |
| 4337.578 | 21.9 | 0.104 | 0.20 | 4337.573 | Cr I(22)4337.566(75) |
| 4337.926 | 78.1 | 0.351 | 0.21 | 4337.920 | Ti II(20)4337.876(18),Ce II(MCS) 4337.77(980) |
| 4338.265 | 4.0 | 0.024 | 0.16 | 4338.260 | Fe I(70)4338.2478((2)) |
| 4338.683 | 7.4 | 0.035 | 0.20 | 4338.678 | Nd II(68)4338.697(80) |
| 4339.462 | 14.2 | 0.084 | 0.16 | 4339.457 | Cr I(22)4339.45(75) |
| 4340.484 | | | | 4340.479 | H-gamma 4340.468 |
| 4341.373 | 16.9 | 0.096 | 0.17 | 4341.368 | Ti II(32)4341.367(14) |
| 4343.243 | 13.6 | 0.066 | 0.19 | 4343.238 | Fe I(645,-)4343.2712;2164((2)),(Cr I(64) 4343.163(18)) |
| 4343.708 | 7.5 | 0.041 | 0.17 | 4343.703 | Fe I(517)4343.6975((2)) |
| 4344.290 | 43.9 | 0.208 | 0.20 | 4344.285 | Ti II(20)4344.299(14) |
| 4344.508 | 44.1 | 0.207 | 0.20 | 4344.502 | Cr II(22)4344.51(100) |
| 4346.290 | 4.9 | 0.031 | 0.15 | 4346.285 | |
| 4346.557 | 19.7 | 0.089 | 0.21 | 4346.552 | Fe I(598)4346.5526((2)) |
| 4346.832 | 6.0 | 0.026 | 0.22 | 4346.827 | Cr I(104)4346.829(30) |
| 4347.860 | 18.6 | 0.065 | 0.27 | 4347.854 | Fe I(828)4347.8326((1)),Sm II(37) |

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| | | | | | 4301.130(40n) |
| 4301.925 | 95.1 | 0.402 | 0.22 | 4301.923 | Ti II(41)4301.923(17) |
| 4302.212 | 35.5 | 0.167 | 0.20 | 4302.210 | Fe I(520)4302.1858((2)) |
| 4302.540 | 110.3 | 0.444 | 0.23 | 4302.539 | Ca I(5)4302.527(60r) |
| 4302.823 | 21.0 | 0.068 | 0.29 | 4302.822 | |
| 4303.176 | 83.5 | 0.372 | 0.21 | 4303.174 | Fe II(237)4303.166(8) |
| 4303.565 | 26.7 | 0.093 | 0.27 | 4303.563 | Nd II(10)4303.58(5400) |
| 4303.877 | 21.5 | 0.089 | 0.23 | 4303.875 | |
| 4304.290 | 4.0 | 0.026 | 0.15 | 4304.289 | |
| 4304.543 | 32.0 | 0.106 | 0.28 | 4304.542 | Fe I(414)4304.5408((1)) |
| 4305.193 | 24.3 | 0.070 | 0.33 | 4305.191 | Fe I(760)4305.2070((1)) |
| 4305.452 | 52.0 | 0.249 | 0.20 | 4305.451 | Fe I(476)4305.4505(3),Cr I(96) 4305.468(30),Sr II(3)4305.447 (40) |
| 4305.723 | 48.5 | 0.200 | 0.23 | 4305.722 | Sc II(15)4305.715(10) |
| 4305.923 | 51.8 | 0.250 | 0.19 | 4305.921 | Ti I(44)4305.910(60) |
| 4306.120 | 7.5 | 0.041 | 0.17 | 4306.119 | |
| 4306.646 | 7.6 | 0.046 | 0.16 | 4306.645 | |
| 4306.803 | 27.0 | 0.102 | 0.25 | 4306.802 | Ce II(1)4306.72(770) |
| 4307.401 | 16.5 | 0.047 | 0.33 | 4307.399 | |
| 4307.861 | 259.7 | 0.677 | 0.36 | 4307.859 | Ti II(41)4307.865(17),Ca I(5) 4307.741(45),Fe I(42) 4307.9023 (35) |
| 4308.310 | 16.0 | 0.054 | 0.28 | 4308.309 | |
| 4308.564 | 15.6 | 0.061 | 0.24 | 4308.563 | (Fe I(172)4308.4949(p)) |
| 4309.037 | 50.8 | 0.199 | 0.24 | 4309.036 | Fe I(849)4309.0307((2)) |
| 4309.386 | 67.0 | 0.286 | 0.22 | 4309.385 | Fe I(414)4309.3745(4) |
| 4309.643 | 56.1 | 0.224 | 0.24 | 4309.642 | Y II(5)4309.620(2215) |
| 4310.146 | 16.4 | 0.049 | 0.31 | 4310.145 | |
| 4310.444 | 17.4 | 0.076 | 0.22 | 4310.442 | Fe I (n) 4310.3741 (?) |
| 4310.683 | 6.4 | 0.031 | 0.19 | 4310.682 | |
| 4310.982 | 8.3 | 0.029 | 0.27 | 4310.980 | |
| 4311.199 | 7.8 | 0.034 | 0.22 | 4311.198 | |
| 4311.498 | 13.0 | 0.052 | 0.23 | 4311.497 | |
| 4311.709 | 4.1 | 0.025 | 0.15 | 4311.708 | |
| 4312.172 | 7.5 | 0.029 | 0.24 | 4312.170 | (Zr II(99)4312.23(3)) |
| 4312.418 | 19.1 | 0.035 | 0.51 | 4312.417 | (Mn I(23)4312.554(100)) |
| 4312.875 | 99.1 | 0.408 | 0.23 | 4312.874 | Ti II(41)4312.874(17) |
| 4313.649 | 4.1 | 0.022 | 0.18 | 4313.647 | |
| 4314.084 | 85.8 | 0.408 | 0.20 | 4314.083 | Sc II(15)4314.084(60) |
| 4314.300 | 51.6 | 0.202 | 0.24 | 4314.298 | Fe II(32)4314.289(4) |
| 4315.022 | 176.4 | 0.563 | 0.29 | 4315.021 | Ti II(41)4314.965(17),Fe I(71) 4315.0846(10) |
| 4316.813 | 34.9 | 0.148 | 0.22 | 4316.812 | Ti II(94)4316.802(13) |
| 4317.308 | 7.8 | 0.033 | 0.23 | 4317.307 | Zr II(40)4317.32(12) |
| 4318.275 | 3.1 | 0.013 | 0.23 | 4318.273 | Fe II(220)4318.216(0N) |
| 4318.662 | 89.2 | 0.378 | 0.22 | 4318.661 | Ca I(5)4318.652(45) |
| 4320.557 | 14.8 | 0.045 | 0.31 | 4320.556 | Fe I(691)4320.4829((1)),Cr I(96) 4320.608(30) |
| 4320.741 | 71.0 | 0.356 | 0.19 | 4320.740 | Sc II(15)4320.745(50),Ce II(125) 4320.72(560) |
| 4320.947 | 71.2 | 0.293 | 0.23 | 4320.945 | Ti II(41)4320.957(14) |
| 4321.784 | 18.7 | 0.078 | 0.22 | 4321.783 | |
| 4322.490 | 2.8 | 0.017 | 0.15 | 4322.489 | La II(25)4322.51(440) |
| 4323.022 | 7.9 | 0.038 | 0.20 | 4323.021 | |
| 4323.210 | 8.3 | 0.042 | 0.18 | 4323.208 | |
| 4323.474 | 22.9 | 0.060 | 0.36 | 4323.473 | Cr I(-)4323.521(30) |
| 4323.898 | 18.6 | 0.059 | 0.30 | 4323.896 | |
| 4324.160 | 2.1 | 0.022 | 0.09 | 4324.159 | |
| 4324.415 | 9.8 | 0.034 | 0.27 | 4324.414 | (Fe II(147)4324.36(p)) |
| 4324.714 | 6.2 | 0.023 | 0.25 | 4324.712 | |
| 4325.006 | 91.1 | 0.380 | 0.23 | 4325.004 | Sc II(15)4325.010(40),Fe I(70) 4324.9486((1)),Cr I(104) |

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| 4284.194 | 35.7 | 0.154 | 0.22 | 4284.192 | Cr II(31)4284.21(20) |
| 4284.442 | 3.9 | 0.026 | 0.14 | 4284.440 | Fe I(417,n)4284.4054((1)) |
| 4284.684 | 10.7 | 0.047 | 0.22 | 4284.683 | Ni I(86)4284.683(6),(Cr I(96) 4284.728(25)) |
| 4284.979 | 11.7 | 0.050 | 0.22 | 4284.978 | Ti I(148)4284.988(8) |
| 4285.444 | 49.1 | 0.221 | 0.21 | 4285.442 | Fe I(597)4285.4420(3),(Sm II(27) 4285.496(200)) |
| 4285.787 | 3.3 | 0.025 | 0.13 | 4285.786 | Co I(1)4285.782(6) |
| 4286.002 | 30.6 | 0.097 | 0.30 | 4286.000 | Ti I(44)4286.006(25) |
| 4286.482 | 19.1 | 0.082 | 0.22 | 4286.480 | Fe I(414)4286.4342((1)),(Zr II(69) 4286.51(5)) |
| 4286.954 | 34.4 | 0.139 | 0.23 | 4286.953 | La II(75)4286.97(600),Fe I(n) 4286.9837((1)) |
| 4287.415 | 13.8 | 0.071 | 0.18 | 4287.414 | Ti I(44)4287.405(22) |
| 4287.892 | 75.6 | 0.342 | 0.21 | 4287.891 | Ti II(20)4287.875(13),(Ni I(178) 4288.005(15)) |
| 4288.112 | 37.2 | 0.149 | 0.23 | 4288.110 | Fe I(273)4288.1458((2)) |
| 4288.728 | 7.1 | 0.040 | 0.17 | 4288.727 | |
| 4289.041 | 40.3 | 0.137 | 0.28 | 4289.040 | Ti I(44)4289.068(25),(Fe I(214) 4288.9560((1)) |
| 4289.367 | 78.0 | 0.386 | 0.19 | 4289.366 | Ca I(5)4289.364(40) |
| 4289.737 | 126.4 | 0.447 | 0.27 | 4289.735 | Cr I(1)4289.733(500),Ce II(MCS) 4289.94(2000) |
| 4290.239 | 138.8 | 0.459 | 0.28 | 4290.237 | Ti II(41)4290.216(18),Fe I(416) 4290.3789((2)) |
| 4290.919 | 41.7 | 0.188 | 0.21 | 4290.917 | Ti I(44)4290.933(20),Fe I(351) 4290.8647((1)) |
| 4291.132 | 17.1 | 0.077 | 0.21 | 4291.130 | (Ti I(45,147)4291.214(5n)) |
| 4291.469 | 35.7 | 0.172 | 0.20 | 4291.468 | Fe I(3)4291.4637(4) |
| 4292.126 | 28.2 | 0.086 | 0.31 | 4292.125 | (Fe I(70)4292.1178(p)) |
| 4292.322 | 3.7 | 0.026 | 0.13 | 4292.320 | Fe I(70)4292.2844((1)) |
| 4293.090 | 19.5 | 0.086 | 0.21 | 4293.088 | Zr II(110)4293.14(7) |
| 4294.113 | 139.2 | 0.556 | 0.24 | 4294.111 | Ti II(20)4294.094(19),Fe I(41) 4294.1248(15) |
| 4294.768 | 34.5 | 0.161 | 0.20 | 4294.767 | Sc II(15)4294.767(8),(Fe I(598) 4294.939((1w))) |
| 4295.082 | 16.2 | 0.059 | 0.26 | 4295.081 | |
| 4295.258 | 4.8 | 0.033 | 0.14 | 4295.256 | |
| 4295.797 | 28.1 | 0.107 | 0.25 | 4295.795 | Cr I(64)4295.769(25),Ti I(44) 4295.751(22),Ni I(178) 4295.888 (8) |
| 4296.060 | 12.8 | 0.046 | 0.26 | 4296.059 | La II(53)4296.05(600),Gd II(46) 4296.076(1000) |
| 4296.587 | 73.4 | 0.315 | 0.22 | 4296.585 | Fe II(28)4296.567(6),Ce II(MCS) 4296.67(1500) |
| 4296.929 | 37.0 | 0.073 | 0.48 | 4296.928 | |
| 4297.263 | 7.8 | 0.039 | 0.19 | 4297.262 | |
| 4297.674 | 17.8 | 0.040 | 0.42 | 4297.672 | (V I(120)4297.681(12)),Cr I(247) 4297.753(30) |
| 4298.048 | 46.0 | 0.204 | 0.21 | 4298.046 | Fe I(520)4298.0364((2)),(V I(120) 4298.029(12)) |
| 4298.705 | 38.5 | 0.143 | 0.25 | 4298.704 | Ti I(44)4298.664(40) |
| 4298.989 | 85.5 | 0.377 | 0.21 | 4298.987 | Ca I(5)4298.986(30) |
| 4299.239 | 112.6 | 0.473 | 0.22 | 4299.237 | Ti I(148)4299.229(15),Fe I(597,152) 4299.2349(18),Ce II(47)4299.36 (590) |
| 4299.669 | 49.9 | 0.097 | 0.48 | 4299.667 | Fe I(416)4299.6286((1)),Ti I(43) 4299.636(15) |
| 4300.054 | 122.7 | 0.516 | 0.22 | 4300.053 | Ti II(41)4300.064(19) |
| 4300.280 | 15.3 | 0.080 | 0.18 | 4300.278 | Ce II(134)4300.33(770) |
| 4300.564 | 52.1 | 0.204 | 0.24 | 4300.563 | Ti I(44)4300.566(50) |
| 4300.823 | 18.4 | 0.102 | 0.17 | 4300.822 | Fe I(976)4300.828((1)) |
| 4301.088 | 60.1 | 0.228 | 0.25 | 4301.086 | Ti I(44)4301.089(50),V II(225) |

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| 4267.382 | 10.0 | 0.038 | 0.25 | 4267.381 | |
| 4267.827 | 60.3 | 0.270 | 0.21 | 4267.826 | Fe I(482)4267.8265(5) |
| 4268.088 | 5.5 | 0.026 | 0.20 | 4268.087 | |
| 4268.744 | 30.7 | 0.148 | 0.19 | 4268.743 | Fe I(649)4268.7488(2) |
| 4269.013 | 12.9 | 0.051 | 0.24 | 4269.012 | Cr II(192)4268.96(3) |
| 4269.299 | 20.4 | 0.087 | 0.22 | 4269.298 | Cr II(31)4269.29(10) |
| 4269.503 | 2.0 | 0.021 | 0.09 | 4269.502 | La II(76)4269.50(300) |
| 4269.751 | 18.3 | 0.058 | 0.30 | 4269.750 | |
| 4270,159 | 6.6 | 0.033 | 0.19 | 4270.158 | Ce II(204)4270.19(620) |
| 4271.164 | 127.1 | 0.496 | 0.24 | 4271.163 | Fe I(152)4271.1538(20),Cr I(154) 4271.073(30) |
| 4271.770 | 188.4 | 0.622 | 0.28 | 4271.769 | Fe I(42)4271.7605(35) |
| 4272.526 | 6.1 | 0.030 | 0.19 | 4272.525 | Ti I(44)4272.440(8) |
| 4272.848 | 3.1 | 0.028 | 0.10 | 4272.847 | Cr I(96)4272.93(50) |
| 4273.342 | 56.0 | 0.241 | 0.22 | 4273.341 | Fe II(27)4273.317(3) |
| 4273.870 | 22.0 | 0.089 | 0.23 | 4273.869 | Fe I(478)4273.8685((1)) |
| 4274.195 | 2.4 | 0.022 | 0.10 | 4274.194 | |
| 4274.563 | 5.9 | 0.040 | 0.14 | 4274.562 | Ti I(44,162)4274.584(15) |
| 4274.802 | 122.5 | 0.522 | 0.22 | 4274.801 | Cr I(1)4274.806(800R) |
| 4275.422 | 23.4 | 0.036 | 0.60 | 4275.421 | |
| 4275.575 | 35.1 | 0.159 | 0.21 | 4275.574 | Cr II(31)4275.58(30),Fe I(216) 4275.6986(2n) |
| 4276.685 | 16.4 | 0.085 | 0.18 | 4276.684 | Fe I(n)4276.6761((1)) |

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| 4268.751 | 31.2 | 0.140 | 0.21 | 4268.750 | Fe I(649)4268.7488(2) |
| 4269.019 | 11.7 | 0.050 | 0.22 | 4269.018 | Cr II(192)4268.96(3) |
| 4269.260 | 15.8 | 0.078 | 0.19 | 4269.258 | Cr II(31)4269.29(10) |
| 4269.432 | 9.7 | 0.033 | 0.27 | 4269.431 | La II(76)4269.50(300) |
| 4269.771 | 20.3 | 0.058 | 0.33 | 4269.770 | |
| 4270.168 | 6.7 | 0.040 | 0.16 | 4270.167 | Ce II(204)4270.19(620) |
| 4271.162 | 121.8 | 0.463 | 0.25 | 4271.161 | Fe I(152)4271.1538(20),Cr I(154) 4271.073(30) |
| 4271.768 | 180.3 | 0.591 | 0.29 | 4271.767 | Fe I(42)4271.7605(35) |
| 4272.493 | 4.6 | 0.025 | 0.17 | 4272.492 | Ti I(44)4272.440(8) |
| 4273.327 | 44.6 | 0.215 | 0.20 | 4273.326 | Fe II(27)4273.317(3) |
| 4273.485 | 9.6 | 0.037 | 0.24 | 4273.483 | |
| 4273.872 | 20.6 | 0.091 | 0.21 | 4273.871 | Fe I(478)4273.8685((1)) |
| 4274.570 | 4.4 | 0.034 | 0.12 | 4274.568 | Ti I(44,162)4274.584(15) |
| 4274.801 | 114.3 | 0.484 | 0.22 | 4274.799 | Cr I(1)4274.806(800R) |
| 4275.346 | 16.7 | 0.035 | 0.45 | 4275.345 | |
| 4275.572 | 40.1 | 0.174 | 0.22 | 4275.570 | Cr II(31)4275.570(30),Fe I(216) 4275.6986(2n) |
| 4276.678 | 17.8 | 0.076 | 0.22 | 4276.677 | Fe I(n)4276.6761((1)) |
| 4277.355 | 3.7 | 0.028 | 0.12 | 4277.354 | (Zr II(40)4277.37(4)) |
| 4277.546 | 12.0 | 0.046 | 0.24 | 4277.544 | (Fe I(172)4277.68((1)) |
| 4278.186 | 42.5 | 0.178 | 0.22 | 4278.185 | Ti I(291)4278.231(7),Fe I(691) 4278.2314((1)),Fe II(32)4278.128 ((1)),Cr II(161)4278.11(35) |
| 4278.798 | 5.7 | 0.024 | 0.23 | 4278.796 | (Ti I(252)4278.829(3n)) |
| 4279.030 | 3.6 | 0.016 | 0.22 | 4279.028 | |
| 4279.500 | 14.9 | 0.066 | 0.21 | 4279.499 | Fe I(n)4279.4887((1)) |
| 4279.842 | 29.6 | 0.079 | 0.35 | 4279.840 | Fe I(351)4279.8700((1)) |
| 4280.125 | 2.4 | 0.021 | 0.11 | 4280.124 | (Ce II(225)4280.141((15))) |
| 4280.440 | 26.2 | 0.073 | 0.34 | 4280.438 | Cr I(247)4280.42(75),Gd II(15) 4280.49(910) |
| 4280.807 | 8.4 | 0.046 | 0.17 | 4280.806 | Sm II(46)4280.79(2200) |
| 4281.072 | 22.0 | 0.093 | 0.22 | 4281.070 | Mn I(23)4281.100(500) |
| 4281.984 | 7.2 | 0.033 | 0.20 | 4281.982 | |
| 4282.408 | 95.4 | 0.421 | 0.21 | 4282.407 | Fe I(71)4282.4029(12) |
| 4282.710 | 13.1 | 0.051 | 0.24 | 4282.708 | Ti I(162)4282.702(12) |
| 4283.012 | 88.8 | 0.393 | 0.21 | 4283.011 | Ca I(5)4283.010(40) |

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| | | | | | 4239.7324(3),Fe I(18,273) |
| | | | | | 4239.847(2),Ce II(2)4239.92(980) |
| 4240.408 | 46.4 | 0.189 | 0.23 | 4240.407 | Fe I(n)4240.3708((2)),Ca I(38) |
| | | | | | 4240.456(6) |
| 4240.706 | 9.6 | 0.046 | 0.20 | 4240.705 | Cr I(105,178)4240.714(50) |
| 4241.126 | 9.1 | 0.047 | 0.18 | 4241.125 | Fe I(351)4241.1143((1)) |
| 4242.106 | 2.6 | 0.024 | 0.10 | 4242.105 | |
| 4242.375 | 64.3 | 0.263 | 0.23 | 4242.374 | Cr II(31)4242.36(50) |
| 4242.708 | 33.4 | 0.104 | 0.22 | 4242.707 | Fe I(649)4242.7294((2)) |
| 4243.395 | 36.3 | 0.119 | 0.29 | 4243.394 | Fe I(906)4243.3685((2)) |
| 4243.812 | 13.6 | 0.061 | 0.21 | 4243.811 | Fe I(n)4243.8162((1w)) |
| 4244.805 | 3.5 | 0.017 | 0.19 | 4244.804 | Ni II(9)4244.80(1) |
| 4245.296 | 85.1 | 0.353 | 0.23 | 4245.295 | Fe I(352)4245.2572(6),Fe I(691) |
| | | | | | 4245.3444(tr?) |
| 4246.067 | 42.3 | 0.180 | 0.22 | 4246.066 | Fe I(906)4246.0850(3) |
| 4246.837 | 130.7 | 0.560 | 0.22 | 4246.836 | Sc II(7)4246.829(100) |
| 4247.419 | 99.2 | 0.419 | 0.22 | 4247.418 | Fe I(693)4247.4255(12),Nd II(8) |
| | | | | | 4247.38(2000) |
| 4247.665 | 1.9 | 0.024 | 0.08 | 4247.664 | |
| 4248.240 | 52.1 | 0.225 | 0.22 | 4248.239 | Fe I(482)4248.2240(4) |
| 4248.703 | 20.3 | 0.056 | 0.34 | 4248.702 | Ce II(1)4248.68(1100) |
| 4249.019 | 2.2 | 0.013 | 0.15 | 4249.018 | |
| 4249.591 | 7.0 | 0.034 | 0.20 | 4249.590 | |
| 4250.128 | 116.7 | 0.487 | 0.23 | 4250.127 | Fe I(152)4250.1195(25) |
| 4250.799 | 135.3 | 0.546 | 0.23 | 4250.798 | Fe I(42)4250.7869(25) |
| 4251.727 | 11.1 | 0.009 | 1.15 | 4251.726 | Gd II(15)4251.733(2000) |
| 4252.644 | 23.9 | 0.104 | 0.22 | 4252.643 | Cr II(31)4252.63(10) |
| 4253.922 | 5.2 | 0.031 | 0.16 | 4253.921 | (Fe I(905)4253.9303(p)) |
| 4254.346 | 124.8 | 0.526 | 0.22 | 4254.345 | Cr I(1)4254.331(1000R) |
| 4254.945 | 8.5 | 0.050 | 0.16 | 4254.944 | Fe I(419)4254.9453((1)) |
| 4255.223 | 3.0 | 0.016 | 0.18 | 4255.222 | |
| 4255.526 | 18.7 | 0.069 | 0.25 | 4255.525 | Cr I(105)4255.501(30),Fe I(416) |
| | | | | | 4255.5004((1)) |
| 4255.849 | 12.1 | 0.052 | 0.22 | 4255.848 | Ce II(81)4255.79(620) |
| 4256.184 | 13.5 | 0.055 | 0.23 | 4256.183 | Cr II(192)4256.17(5*l*,d?),Fe I(690) |
| | | | | | 4256.2055((3)) |
| 4256.789 | 5.9 | 0.034 | 0.16 | 4256.788 | Fe I(1102*)4256.8071((1)) |
| 4257.675 | 10.6 | 0.055 | 0.18 | 4257.674 | Mn I(23)4257.669(200) |
| 4258.151 | 66.1 | 0.245 | 0.25 | 4258.150 | Fe II(28)4258.155(3) |
| 4258.345 | 23.4 | 0.125 | 0.18 | 4258.344 | Fe I(3)4258.3158(2) |
| 4258.612 | 25.4 | 0.106 | 0.23 | 4258.611 | Fe I(351)4258.6112((1)) |
| 4258.975 | 18.3 | 0.068 | 0.25 | 4258.974 | Fe I(419)4258.9517((1)) |
| 4259.185 | 4.6 | 0.035 | 0.12 | 4259.184 | (Cr I(131)4259.136(10w)) |
| 4259.332 | 5.2 | 0.034 | 0.15 | 4259.331 | (Fe I(416)4259.3358(*?)) |
| 4260.076 | 92.6 | 0.298 | 0.29 | 4260.075 | Fe I(689)4259.9992((2)),Fe I(476a) |
| | | | | | 4260.1352((1)) |
| 4260.475 | 147.4 | 0.591 | 0.23 | 4260.474 | Fe I(152)4260.4744(35) |
| 4260.732 | 34.3 | 0.126 | 0.26 | 4260.731 | (Fe I(351)4260.7289(p)),V II(18.24) |
| | | | | | 4260.75(9n) |
| 4261.267 | 16.8 | 0.041 | 0.38 | 4261.266 | Cr I(96)4261.353(60),Mn I(C) |
| | | | | | 4261.301(30) |
| 4261.609 | 9.4 | 0.037 | 0.24 | 4261.608 | Cr I(-)4261.627(25) |
| 4261.917 | 56.6 | 0.236 | 0.23 | 4261.916 | Cr II(31)4261.92(30) |
| 4262.311 | 12.3 | 0.024 | 0.48 | 4262.310 | Cr I(84,178)4262.129(22) |
| 4262.657 | 2.5 | 0.017 | 0.14 | 4262.656 | Sm II(37)4262.677(300) |
| 4263.163 | 15.1 | 0.073 | 0.19 | 4263.162 | Cr I(247)4263.149(70),Ti I(162) |
| | | | | | 4263.134(15) |
| 4264.210 | 28.8 | 0.138 | 0.20 | 4264.209 | Fe I(692)4264.2034((2)) |
| 4264.467 | 3.0 | 0.016 | 0.17 | 4264.466 | |
| 4264.742 | 12.1 | 0.058 | 0.20 | 4264.741 | Fe I(993)4264.743((1)) |
| 4256.260 | 18.2 | 0.103 | 0.17 | 4265.259 | Fe I(n)4265.2681((2)) |
| 4265.923 | 14.5 | 0.068 | 0.20 | 4265.922 | Mn I(23)4265.928(400) |
| 4266.959 | 42.4 | 0.177 | 0.23 | 4266.958 | Fe I(273)4266.9645(3) |

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| 4215.025 | 4.7 | 0.024 | 0.18 | 4215.024 | Gd II(32)4215.023(600) |
| 4215.225 | 193.1 | 0.671 | 0.27 | 4215.524 | Sr II(1)4215.524(300r),Fe I(419) 4215.4777(2) |
| 4216.185 | 79.1 | 0.341 | 0.22 | 4216.184 | Fe I(3)4216.1838(8) |
| 4217.171 | 10.9 | 0.049 | 0.21 | 4217.170 | Gd II(49)4217.195(500) |
| 4217.311 | 2.8 | 0.026 | 0.10 | 4217.310 | |
| 4217.556 | 73.4 | 0.342 | 0.20 | 4217.555 | Fe I(693)4217.5456(7n),La II(78) 4217.560(200)Cr I(132)4217.65 (50) |
| 4218.245 | 12.0 | 0.058 | 0.19 | 4218.244 | (Fe I(172)4218.210(p)) |
| 4219.715 | 6.0 | 0.035 | 0.16 | 4218.714 | |
| 4219.365 | 100.2 | 0.422 | 0.22 | 4219.364 | Fe I(800)4219.3604(12) |
| 4220.057 | 14.4 | 0.069 | 0.20 | 4220.056 | V II(25)4220.047(10) |
| 4220.343 | 47.0 | 0.213 | 0.21 | 4220.342 | Fe I(482)4220.3417(4) |
| 4221.539 | 6.7 | 0.023 | 0.27 | 4221.538 | Cr I(155,248)4221.583(40) |
| 4222.218 | 87.9 | 0.401 | 0.21 | 4222.217 | Fe I(152)4222.2131(12) |
| 4222.602 | 15.1 | 0.053 | 0.27 | 4222.601 | Ce II(36)4222.60(1500) |
| 4223.052 | 7.0 | 0.024 | 0.27 | 4223.051 | |
| 4223.532 | 21.0 | 0.034 | 0.57 | 4223.531 | (Cr I(132)4223.47(7)) |
| 4224.181 | 79.9 | 0.362 | 0.21 | 4224.180 | Fe I(689)4224.1717(6n) |
| 4224.507 | 52.2 | 0.241 | 0.20 | 4224.506 | Fe I(689)4224.5128(3n),V II(25) 4224.51(70),Cr I(155)4224.514 (18) |
| 4224.855 | 21.3 | 0.084 | 0.24 | 4224.854 | Cr II(162)4224.85(25) |
| 4225.188 | 10.1 | 0.059 | 0.16 | 4225.187 | V II(37)4225.228(120) |
| 4225.455 | 90.3 | 0.338 | 0.25 | 4225.454 | Fe I(693)4225.4543(6n) |
| 4225.941 | 64.0 | 0.191 | 0.31 | 4225.940 | Fe I(521*)4225.9557(3) |
| 4226.404 | 43.6 | 0.214 | 0.19 | 4226.403 | Fe I(352)4226.4240(3) |
| 4226.732 | 278.0 | 0.732 | 0.36 | 4226.731 | Ca I(2)4226.728(500R),Cr I(105) 4226.753(40) |
| 4227.407 | 147.7 | 0.514 | 0.27 | 4227.406 | Ti II(33)4227.353(9),Fe I(693) 4227.4266(30) |
| 4227.811 | 17.7 | 0.052 | 0.32 | 4227.810 | Ce II(8)4227.75(770) |
| 4228.312 | 5.4 | 0.026 | 0.19 | 4228.311 | |
| 4228.698 | 3.6 | 0.018 | 0.19 | 4228.697 | (Fe I(690)4228.7184(p)) |
| 4229.505 | 25.1 | 0.119 | 0.20 | 4229.504 | Fe I(649)4229.5102(1gn) |
| 4229.782 | 24.5 | 0.103 | 0.22 | 4229.781 | Fe I(41)4229.7516((1)),Sm II(4) 4229.704(300) |
| 4230.526 | 3.8 | 0.033 | 0.11 | 4230.525 | Cr I(132)4230.494(35) |
| 4231.025 | 13.3 | 0.072 | 0.17 | 4231.024 | Ni I(136)4231.040(5) |
| 4231.651 | 5.9 | 0.040 | 0.14 | 4231.650 | Zr II(99)4231.640(8) |
| 4231.956 | 12.5 | 0.046 | 0.26 | 4231.955 | V II(225)4232.065(80n) |
| 4232.408 | 3.7 | 0.020 | 0.18 | 4232.407 | Nd II(8)4232.38(1300) |
| 4232.801 | 10.4 | 0.034 | 0.29 | 4232.800 | Fe I(3)4232.7263(-),Cr I(132) 4232.866(10) |
| 4233.178 | 129.8 | 0.526 | 0.23 | 4233.177 | Fe II(27)4233.167(11),Cr II(31) 4233.26(18) |
| 4233.609 | 106.7 | 0.458 | 0.22 | 4233.608 | Fe I(152)4233.6028(18) |
| 4234.235 | 6.5 | 0.022 | 0.27 | 4234.234 | |
| 4235.167 | 24.8 | 0.115 | 0.20 | 4235.166 | Mn I(23)4235.154(400) |
| 4235.501 | 27.5 | 0.142 | 0.18 | 4235.300 | Mn I(23)4235.300(800) |
| 4235.941 | 140.2 | 0.507 | 0.26 | 4235.940 | Fe I(152)4235.9370(25) |
| 4236.304 | 12.0 | 0.048 | 0.24 | 4236.303 | Ni I(237)4236.372((2)) |
| 4236.800 | 9.0 | 0.031 | 0.28 | 4236.799 | Fe I(906)4236.760((1)),(Sm II(53) 4236.76(1200)) |
| 4237.167 | 35.9 | 0.151 | 0.22 | 4237.166 | Fe I(19)4237.0742((2)),Fe I(-) 4237.162(2) |
| 4238.024 | 59.4 | 0.275 | 0.20 | 4238.023 | Fe I(689)4238.0238(4) |
| 4238.378 | 13.3 | 0.052 | 0.24 | 4238.377 | La II(41)4238.38(1600) |
| 4238.814 | 91.0 | 0.383 | 0.22 | 4238.813 | Fe I(693)4238.8100(10n),Gd II(-) 4238.78(650) |
| 4239.363 | 17.5 | 0.081 | 0.20 | 4239.362 | Fe I(n)4239.3613(3) |
| 4239.811 | 106.7 | 0.364 | 0.28 | 4239.810 | Mn I(23)4239.737(200),Fe I(416) |

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| 4202.035 | 127.5 | 0.522 | 0.23 | 4202.034 | Fe I(42)4202.0292(30) |
| 4202.345 | 28.7 | 0.106 | 0.25 | 4202.344 | V II(25)4202.350(150) |
| 4202.757 | 16.1 | 0.077 | 0.20 | 4202.756 | Fe I(521*)4202.7530((1)) |
| 4202.992 | 9.8 | 0.034 | 0.27 | 4202.991 | Ce II(186)4202.94(910) |
| 4203.550 | 10.3 | 0.067 | 0.14 | 4203.549 | Fe I(19)4203.5678((1)),Cr I(35) 4203.590(50) |
| 4203.974 | 81.9 | 0.374 | 0.21 | 4203.973 | Fe I(850)4203.9383((1)),Fe I(355) 4203.9848(10) |
| 4204.185 | 10.6 | 0.041 | 0.24 | 4204.184 | Cr I(35)4204.20(30),V II(25)4204.20 (20) |
| 4204.482 | 2.2 | 0.021 | 0.10 | 4204.481 | Cr I(272)4204.48(55) |
| 4204.732 | 17.9 | 0.076 | 0.22 | 4204.731 | Y II(1)4204.692(474) |
| 4205.064 | 40.6 | 0.152 | 0.25 | 4205.063 | Eu II(1)4205.05(60000) |
| 4205.427 | 26.9 | 0.095 | 0.27 | 4205.426 | Fe II(22)4205.48(p) |
| 4205.563 | 22.5 | 0.116 | 0.18 | 4205.562 | Fe I(689)4205.5385((2)) |
| 4206.695 | 46.3 | 0.199 | 0.22 | 4206.694 | Fe I(3)4206.6967(3) |
| 4207.131 | 42.2 | 0.201 | 0.20 | 4207.130 | Fe I(352)4207.1271(4) |
| 4207.384 | 8.7 | 0.042 | 0.19 | 4207.383 | Cr II(26)4207.36(4) |
| 4207.809 | 3.4 | 0.020 | 0.16 | 4207.808 | |
| 4208.322 | 2.9 | 0.020 | 0.13 | 4208.321 | Cr I(249)4208.36(40) |
| 4208.608 | 53.6 | 0.237 | 0.21 | 4208.607 | Fe I(689)4208.6040(30) |
| 4208.989 | 30.0 | 0.143 | 0.20 | 4208.988 | Zr II(41)4208.99(30),Cr II(162) 4209.05(3) |
| 4209.404 | 8.5 | 0.036 | 0.22 | 4209.403 | (Ce II(3)4209.409((25))),Cr I(248) 4209.37(60) |
| 4209.798 | 24.1 | 0.072 | 0.31 | 4209.797 | Cr I(155)4209.76(40) |
| 4210.357 | 99.3 | 0.420 | 0.22 | 4210.356 | Fe I(152)4210.3436(15) |
| 4210.944 | 7.9 | 0.029 | 0.26 | 4210.943 | |
| 4211.890 | 24.5 | 0.105 | 0.22 | 4211.889 | Zr II(15)4211.88(12),Gd II(15) 4212.001(800) |
| 4212.640 | 8.2 | 0.035 | 0.22 | 4212.639 | |
| 4213.649 | 49.1 | 0.231 | 0.20 | 4213.648 | Fe I(355)4213.6474(5) |
| 4213.895 | 3.2 | 0.018 | 0.16 | 4213.894 | |
| 4215.223 | 8.4 | 0.022 | 0.36 | 4215.222 | |
| 4215.524 | 176.7 | 0.634 | 0.26 | 4215.523 | Sr II(1)4215.524(300r),Fe I(419) 4215.4777(2) |
| 4215.783 | 6.8 | 0.050 | 0.13 | 4215.782 | Cr II(18)4215.761(2) |
| 4215.956 | 7.3 | 0.050 | 0.14 | 4215.955 | Fe I(273)4215.9678((1)) |
| 4216.186 | 74.4 | 0.330 | 0.21 | 4216.185 | Fe I(3)4216.1838(8) |
| 4216.502 | 4.7 | 0.020 | 0.22 | 4216.501 | |
| 4217.002 | 2.7 | 0.017 | 0.15 | 4217.001 | Cr II(18)4217.07(2) |
| 4217.238 | 9.3 | 0.037 | 0.24 | 4217.237 | Gd II(49)4217.195(500) |
| 4217.553 | 70.7 | 0.317 | 0.21 | 4217.552 | Fe I(693)4217.5456(7n),La II(78) 4217.560(200),Cr I(132)4217.65 (50) |
| 4218.232 | 11.7 | 0.044 | 0.25 | 4218.231 | (Fe I(172)4218.210(p)) |
| 4218.746 | 5.7 | 0.036 | 0.15 | 4218.745 | |
| 4219.366 | 93.5 | 0.387 | 0.23 | 4219.365 | Fe I(800)4219.3604(12) |
| 4220.056 | 11.9 | 0.050 | 0.22 | 4220.055 | V II(25)4220.047(10) |
| 4220.343 | 44.4 | 0.195 | 0.21 | 4220.342 | Fe I(482)4220.3417(4) |
| 4221.521 | 4.3 | 0.026 | 0.16 | 4221.520 | Cr I(155,248)4221.583(40) |
| 4222.219 | 83.1 | 0.373 | 0.21 | 4222.218 | Fe I(152)4222.2131(12) |
| 4222.594 | 15.5 | 0.057 | 0.26 | 4222.593 | Ce II(36)4222.60(1500) |
| 4223.083 | 8.8 | 0.024 | 0.34 | 4223.082 | |
| 4223.511 | 11.3 | 0.034 | 0.31 | 4223.510 | (Cr I(132)4223.47(7)) |

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| 4211.879 | 28.5 | 0.115 | 0.23 | 4211.878 | Zr II(15)4211.88 (12),Gd II(15) 4212.001(800) |
| 4212.384 | 2.6 | 0.017 | 0.14 | 4212.383 | |
| 4213.628 | 6.0 | 0.035 | 0.16 | 4212.627 | |
| 4213.653 | 54.0 | 0.253 | 0.20 | 4213.652 | Fe I(355)4213.6474(5) |

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| 4180.817 | 3.8 | 0.018 | 0.20 | 4180.816 | |
| 4181.140 | 2.0 | 0.016 | 0.12 | 4181.139 | |
| 4181.626 | 24.3 | 0.089 | 0.26 | 4181.625 | |
| 4181.771 | 80.5 | 0.375 | 0.20 | 4181.770 | Fe I(354)4181.7547(15) |
| 4181.967 | 38.5 | 0.188 | 0.19 | 4181.966 | |
| 4182.383 | 50.2 | 0.232 | 0.20 | 4182.382 | Fe I(476a)4182.3826(4) |
| 4182.767 | 17.8 | 0.080 | 0.21 | 4182.766 | Fe I(694)4182.7577(2b,gn) |
| 4182.996 | 5.5 | 0.032 | 0.16 | 4182.995 | Fe I(697)4183.0061((1)),Cr I(K) 4183.071(30) |
| 4183.433 | 28.0 | 0.100 | 0.26 | 4183.432 | V II(37)4183.435(250) |
| 4183.999 | 70.5 | 0.263 | 0.25 | 4183.998 | |
| 4184.316 | 38.3 | 0.170 | 0.21 | 4184.315 | Ti II(21)4184.309(9),Gd II(15) 4184.252(2000),Ni I(89)4184.475 ((4)) |
| 4184.896 | 69.9 | 0.330 | 0.20 | 4184.895 | Cr I(155)4184.901(40),Fe I(355) 4184.8918(10) |
| 4185.345 | 2.3 | 0.019 | 0.12 | 4185.344 | Cr I(106)4185.347(30) |
| 4186.217 | 4.9 | 0.016 | 0.29 | 4186.216 | Ti I(129)4186.119(25) |
| 4186.613 | 24.1 | 0.103 | 0.22 | 4186.612 | Ce II(1)4186.60(3500) |
| 4187.046 | 106.4 | 0.448 | 0.22 | 4187.045 | Fe I(152)4187.0390(20) |
| 4187.607 | 45.8 | 0.157 | 0.27 | 4187.606 | Fe I(694)4187.5870((1)) |
| 4187.814 | 101.7 | 0.431 | 0.22 | 4187.813 | Fe I(152)41877954(20) |
| 4188.737 | 69.8 | 0.294 | 0.22 | 4188.736 | Fe I(n)4188.7316(2n) |
| 4189.015 | 7.1 | 0.036 | 0.19 | 4189.014 | Ti II(H)4188.984(10) |
| 4189.561 | 17.6 | 0.081 | 0.21 | 4189.560 | Fe I(n)4189.5566((2)) |
| 4190.219 | 10.4 | 0.037 | 0.27 | 4190.218 | Ti II(21)4190.164(4),Cr I(84) 4190.15(40) |
| 4191.433 | 101.3 | 0.427 | 0.22 | 4191.432 | Fe I(152)4191.4307(15),(Cr I(35) 4191.274(50)) |
| 4191.679 | 43.1 | 0.212 | 0.19 | 4191.678 | Fe I(355)4191.6765((2)) |
| 4192.076 | 7.0 | 0.032 | 0.21 | 4192.075 | Ni II(10)4192.07(1),Cr I(273) 4192.113(40) |
| 4192.558 | 4.5 | 0.029 | 0.15 | 4192.557 | |
| 4193.725 | 10.6 | 0.038 | 0.26 | 4193.724 | Cr I(248)4193.662(60) |
| 4194.909 | 12.3 | 0.038 | 0.30 | 4194.908 | Cr I(248)4194.96(55) |
| 4195.334 | 72.0 | 0.335 | 0.20 | 4195.333 | Fe I(693)4195.3291(5),Cr II(161) 4195.33(6),Cr II(K)4195.51(4) |
| 4195.592 | 44.6 | 0.181 | 0.23 | 4195.591 | Fe I(478)4195.6179((3)),Ni I(239) 4195.531(4) |
| 4196.213 | 61.9 | 0.290 | 0.20 | 4196.212 | Fe I(693)4196.2083(4),Ce II(MCS) 4196.34(630) |
| 4196.547 | 30.2 | 0.110 | 0.26 | 4196.546 | Fe I(418)4196.5311((1)),La II(41) 4196.55(1500) |
| 4197.054 | 2.2 | 0.017 | 0.12 | 4197.053 | Fe I(18)4197.0971(2) |
| 4197.244 | 9.9 | 0.031 | 0.30 | 4197.243 | Cr I(249)4197.24(50) |
| 4197.655 | 8.6 | 0.030 | 0.27 | 4197.654 | (Gd II(-)4197.681(800)) |
| 4198.071 | 53.0 | 0.199 | 0.25 | 4198.070 | |
| 4198.292 | 126.8 | 0.517 | 0.23 | 4198.291 | Fe I(693)4198.2669((1)),Fe I(152) 4198.3043(20) |
| 4198.629 | 70.1 | 0.289 | 0.23 | 4198.628 | Cr I(249)4198.54(55),Fe I(693) 4198.6341(4n),Ce II(MCS) 4198.72(840) |
| 4199.099 | 103.3 | 0.437 | 0.22 | 4199.098 | Fe I(522)4199.0952(20) |
| 4199.311 | 9.7 | 0.031 | 0.29 | 4199.310 | Y II(5)4199.273(146) |
| 4199.940 | 23.1 | 0.088 | 0.25 | 4199.939 | Fe I(3)4199.9835(1),(Cr I(-)4200.10 (35)) |
| 4200.536 | 8.1 | 0.040 | 0.19 | 4200.535 | Ni I(89)4200.464(5) |
| 4200.714 | 4.5 | 0.031 | 0.14 | 4200.713 | Ti I(220)4200.752(6) |
| 4200.921 | 55.1 | 0.236 | 0.22 | 4200.920 | Fe I(689)4200.9242(3n) |
| 4201.720 | 14.9 | 0.061 | 0.23 | 4201.719 | Ni I(238)4201.723(5),Fe I(799) 4201.799((1)),Mn I(C)4201.778 (60) |

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| 4162.680 | 2.2 | 0.018 | 0.11 | 4162.679 | |
| 4163.447 | 8.0 | 0.039 | 0.19 | 4163.446 | |
| 4163.642 | 85.0 | 0.384 | 0.21 | 4163.641 | Ti II(105)4163.634(19),Cr I(35) 4163.627(75),Fe I(274) 4163.6763((1)) |
| 4164.011 | 5.6 | 0.015 | 0.34 | 4164.010 | (V II(37)4164.015(15)) |
| 4164.253 | 3.7 | 0.019 | 0.18 | 4164.252 | (Fe I(694)4164.240(p)) |
| 4164.781 | 2.8 | 0.014 | 0.18 | 4164.780 | Fe I(418)4164.7818((1)) |
| 4165.090 | 5.7 | 0.027 | 0.20 | 4165.089 | |
| 4165.386 | 18.6 | 0.089 | 0.20 | 4165.385 | Fe I (n)4165.3580 (?) |
| 4165.581 | 17.8 | 0.085 | 0.20 | 4165.580 | Cr I(305)4165.52(60),Ce II(10) 4165.61(1300) |
| 4166.001 | 3.1 | 0.019 | 0.16 | 4166.000 | Ba II(4)4166.003(20) |
| 4166.732 | 3.4 | 0.020 | 0.16 | 4166.731 | |
| 4166.972 | 14.9 | 0.061 | 0.23 | 4166.971 | Ce II(MCS)4166.88(620) |
| 4167.277 | 126.4 | 0.454 | 0.26 | 4167.276 | Mg I(15,15)4167.2604(10n) ,.2712 (10n) |
| 4167.563 | 27.1 | 0.060 | 0.43 | 4167.562 | |
| 4167.840 | 10.4 | 0.041 | 0.24 | 4167.839 | Fe I(599)4167.8587((2)) |
| 4167.932 | 26.9 | 0.105 | 0.24 | 4167.931 | |
| 4168.621 | 12.4 | 0.064 | 0.18 | 4168.620 | Fe I(689)4168.6147(1w) |
| 4168.953 | 16.0 | 0.086 | 0.18 | 4168.952 | Fe I(694)4168.9416((1w)) |
| 4169.779 | 19.8 | 0.074 | 0.25 | 4169.778 | Fe I(693)4169.7562((1)), |
| 4170.949 | 88.7 | 0.338 | 0.25 | 4170.948 | Fe I(482)4170.9018(5),Cr II(181) 4170.860(1) |
| 4171.080 | 19.0 | 0.111 | 0.16 | 4171.079 | Ti I(206)4171.018(8) |
| 4171.685 | 18.4 | 0.102 | 0.17 | 4171.684 | Cr II(261)4171.675(12),Fe I(941) 4171.6908((2)),Cr I(261)4171.676 (40) |
| 4171.897 | 72.2 | 0.340 | 0.20 | 4171.896 | Ti II(105)4171.919(19),Fe I(650) 4171.8993((2)),Cr II(18)4171.92 (3) |
| 4172.112 | 63.0 | 0.275 | 0.22 | 4172.111 | Fe I(649)4172.1222(5) |
| 4172.688 | 101.2 | 0.340 | 0.28 | 4172.687 | Fe I(689)4172.6408((1)),Cr I(K) 4172.782(50),Fe I(19)4172.7448 (4) |
| 4172.992 | 2.7 | 0.032 | 0.08 | 4172.991 | (Fe I(1073*)4172.9620(p)) |
| 4173.461 | 149.6 | 0.508 | 0.28 | 4173.460 | Fe II(27)4173.450(8),Ti II(21) 4173.531(13) |
| 4173.978 | 47.3 | 0.182 | 0.24 | 4173.977 | Fe I(19)4173.9207(2),Ti II(105) 4174.053(13) |
| 4174.345 | 12.5 | 0.049 | 0.24 | 4174.344 | (Fe I(799)4174.4019((1))) |
| 4174.902 | 54.3 | 0.260 | 0.20 | 4174.901 | Fe I(19)4174.9131(5),Cr I(241) 4174.808(75),Cr I(278)4174.96 (25) |
| 4175.115 | 7.6 | 0.024 | 0.29 | 4175.114 | Cr I(261)4175.235(35) |
| 4175.639 | 74.8 | 0.344 | 0.20 | 4175.638 | Fe I(354)4175.6361(10),Nd II(39) 4175.61(810) |
| 4175.923 | 8.3 | 0.037 | 0.21 | 4175.922 | Cr I(106)4175.958(40) |
| 4176.570 | 68.4 | 0.306 | 0.21 | 4176.569 | Fe I(695)4176.5659(7n),Mn I(C) 4176.608(1000),Cr I(K)4176.68 (25) |
| 4177.173 | 29.2 | 0.026 | 1.04 | 4177.172 | Nd II(10)4177.321(2400) |
| 4177.605 | 139.0 | 0.470 | 0.28 | 4177.604 | Fe I(18)4177.5939(4),Y II(14) 4177.528 (1633),(Cr I(K)4177.84 (50h)) |
| 4178.055 | 27.1 | 0.114 | 0.22 | 4178.054 | Cr I(K)4178.07(25w) |
| 4178.444 | 10.5 | 0.045 | 0.22 | 4178.443 | V II(25)4178.390(60) |
| 4178.862 | 90.5 | 0.380 | 0.22 | 4178.861 | Fe II(28)4178.855(8) |
| 4179.366 | 81.2 | 0.303 | 0.25 | 4179.365 | Cr II(26)4179.43(12),Cr I(K)4179.42 (20),Pr II(4)4179.38(5200) |
| 4179.766 | 3.9 | 0.021 | 0.18 | 4179.765 | Zr II(99)4179.81(15) |
| 4180.404 | 2.7 | 0.016 | 0.16 | 4180.403 | (Fe I(274)4180.4103(p)) |

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| 4150.961 | 18.8 | 0.087 | 0.20 | 4150.963 | Ti I(206)4150.963(10),Cr II(163) 4151.000(5) |
| 4151.756 | 8.9 | 0.040 | 0.21 | 4151.758 | (Fe II(12)4151.79(p)) |
| 4151.936 | 21.7 | 0.127 | 0.16 | 4151.938 | Fe I(764)4151.9448((1)),La II(40) 4151.97(1100),Ce II(2)4151.97 (1400) |
| 4152.119 | 85.9 | 0.320 | 0.25 | 4152.121 | Fe I(18)4152.1692(4) |
| 4152.733 | 6.1 | 0.021 | 0.28 | 4152.735 | (La II(78)4152.78(100)),Cr I(261) 4152.779(40) |
| 4153.381 | 3.7 | 0.013 | 0.27 | 4153.383 | |
| 4153.894 | 85.6 | 0.377 | 0.21 | 4153.896 | Fe I(695)4153.8997(10n),Cr I(35) 4153.812(60) |
| 4154.112 | 28.5 | 0.118 | 0.23 | 4154.114 | Fe I(694)4154.0985((1)) |
| 4154.499 | 79.2 | 0.362 | 0.21 | 4154.501 | Fe I(355)4154.4987(12) |
| 4154.806 | 78.7 | 0.354 | 0.21 | 4154.808 | Fe I(694)4154.8055(9n) |
| 4155.952 | 9.9 | 0.043 | 0.21 | 4155.954 | (Nd II(10)4156.08(3000)) |
| 4156.291 | 81.0 | 0.221 | 0.34 | 4156.293 | Zr II(29)4156.24(15) |
| 4156.773 | 106.3 | 0.395 | 0.25 | 4156.775 | Fe I(354)4156.7988(12) |
| 4157.182 | 5.1 | 0.024 | 0.20 | 4157.184 | |
| 4157.780 | 76.6 | 0.339 | 0.21 | 4157.782 | Fe I(695)4157.7801(8n) |
| 4158.404 | 3.6 | 0.016 | 0.22 | 4158.406 | |
| 4158.799 | 59.1 | 0.275 | 0.20 | 4158.801 | Fe I(659)4158.7924(5n) |
| 4159.177 | 54.0 | 0.227 | 0.22 | 4159.179 | |
| 4160.138 | 8.0 | 0.029 | 0.26 | 4160.140 | |
| 4160.359 | 18.7 | 0.090 | 0.20 | 4160.361 | |
| 4160.570 | 16.7 | 0.044 | 0.36 | 4160.572 | Fe I(419)4160.5521((1)) |
| 4161.175 | 50.9 | 0.182 | 0.26 | 4161.177 | Zr II(42)4161.20(20) |
| 4161.523 | 59.9 | 0.272 | 0.21 | 4161.525 | Fe I(n)4161.4844((1)),Ti II(21) 4161.527(11),Cr I(305) 4161.43 (55) |
| 4161.794 | 22.6 | 0.116 | 0.18 | 4161.796 | Sr II(3)4161.796(30) |
| 4163.405 | 7.3 | 0.042 | 0.16 | 4163.407 | |
| 4163.642 | 90.9 | 0.398 | 0.21 | 4163.644 | Ti II(105)4163.634(19),Cr I(35) 4163.627(75),Fe I(274) 4163.6763((1)) |
| 4164.282 | 3.9 | 0.018 | 0.20 | 4164.284 | (Fe I(694)4164.240(p)) |
| 4164.842 | 5.2 | 0.018 | 0.27 | 4164.844 | Fe I(418)4164.7818((1)) |
| 4165.119 | 6.0 | 0.028 | 0.20 | 4165.121 | |
| 4165.409 | 26.6 | 0.097 | 0.26 | 4165.411 | Fe I(n) 4165.3580 (?) |
| 4165.609 | 14.3 | 0.083 | 0.16 | 4165.611 | Cr I(305)4165.52(60),Ce II(10) 4165.61(1300) |
| 4166.017 | 3.0 | 0.020 | 0.14 | 4166.019 | Ba II(4)4166.003(20) |
| 4166.676 | 2.6 | 0.016 | 0.15 | 4166.678 | |
| 4166.967 | 22.1 | 0.072 | 0.29 | 4166.969 | Ce II(MCS)4166.88(620) |
| 4167.276 | 126.5 | 0.481 | 0.25 | 4167.278 | Mg I(15,15)4167.2604 (10n), .2712(10n) |
| 4167.529 | 23.0 | 0.086 | 0.25 | 4167.531 | |
| 4167.899 | 47.7 | 0.159 | 0.28 | 4167.901 | Fe I(599)4167.8587((2)) |
| 4168.634 | 14.9 | 0.068 | 0.21 | 4168.636 | Fe I(689)4168.6147(1w) |
| 4168.950 | 19.0 | 0.091 | 0.20 | 4168.952 | Fe I(694)4168.9416((1w)) |

4190Å Region

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| 4158.406 | 3.1 | 0.016 | 0.18 | 4158.405 | |
| 4158.795 | 62.0 | 0.273 | 0.21 | 4158.794 | Fe I(659)4158.7924(5n) |
| 4159.170 | 59.9 | 0.250 | 0.22 | 4159.169 | |
| 4160.366 | 33.4 | 0.101 | 0.31 | 4160.365 | |
| 4160.682 | 6.8 | 0.029 | 0.22 | 4160.681 | |
| 4161.167 | 49.5 | 0.179 | 0.26 | 4161.166 | Zr II(42)4161.20(20) |
| 4161.512 | 54.6 | 0.264 | 0.19 | 4161.511 | Fe I(n)4161.4844((1)),Ti II(21) 4161.527(11),Cr I(305)4161.43 (55) |
| 4161.778 | 25.1 | 0.106 | 0.22 | 4161.777 | Sr II(3)4161.796(30) |

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| 4127.605 | 55.4 | 0.286 | 0.18 | 4127.607 | Fe I(357)4127.6078(7),Cr I(65) 4127.639(40) |
| 4127.786 | 56.6 | 0.231 | 0.23 | 4127.788 | Fe I(727)4127.8128(3n) |
| 4128.104 | 47.4 | 0.227 | 0.20 | 4128.106 | Si II(3)4128.067(300H) |
| 4128.748 | 34.7 | 0.169 | 0.19 | 4128.750 | Fe II(27)4128.735(3) |
| 4129.166 | 28.9 | 0.140 | 0.19 | 4129.168 | Ti II(H)4129.148(11),Cr I(97) 4129.20 (50WH),Fe I(698) 4129.22 ((1)) |
| 4129.458 | 11.5 | 0.050 | 0.22 | 4129.460 | (Fe I(695)4129.4611(p)) |
| 4129.718 | 20.5 | 0.088 | 0.22 | 4129.720 | Eu II(1)4129.70(33000) |
| 4130.020 | 9.9 | 0.050 | 0.19 | 4130.022 | Fe I(44,486)4130.0367((1)) |
| 4130.376 | 3.4 | 0.021 | 0.15 | 4130.378 | Gd II(19,49)4130.37(2200) |
| 4130.664 | 34.3 | 0.157 | 0.20 | 4130.666 | Ba II(4)4130.648(80),Ce II(209) 4130.71(530) |
| 4130.871 | 18.2 | 0.105 | 0.16 | 4130.873 | Si II(3)4130.893(500H) |
| 4131.085 | 11.2 | 0.040 | 0.26 | 4131.087 | Ce II(112)4131.10(480),Mn I(C) 4131.111(150) |
| 4132.048 | 144.7 | 0.541 | 0.25 | 4132.050 | Fe I(43)4132.0582(25) |
| 4132.518 | 47.4 | 0.156 | 0.29 | 4132.520 | (Fe I(1103)4132.5329(p)),Cr II(26) 4132.41(7) |
| 4132.901 | 69.5 | 0.326 | 0.20 | 4132.903 | Fe I(357)4132.8992(8) |
| 4133.613 | 9.5 | 0.045 | 0.20 | 4133.615 | |
| 4133.842 | 51.6 | 0.234 | 0.21 | 4133.844 | Fe I(698)4133.8557((2)),Ce II(4) 4133.80(2700) |
| 4134.411 | 49.1 | 0.197 | 0.23 | 4134.413 | Fe I(482,697)4134.4207((1)),V I(27) 4134.488(60),Cr I(K)4134.387(35) |
| 4134.682 | 80.0 | 0.376 | 0.20 | 4134.684 | Fe I(357)4134.6776(12) |
| 4136.525 | 27.5 | 0.126 | 0.20 | 4136.527 | Fe I(694)4136.5213((1)) |
| 4136.998 | 67.6 | 0.300 | 0.21 | 4137.000 | Fe I(726)4137.002(7) |
| 4137.397 | 26.9 | 0.102 | 0.25 | 4137.399 | (Fe I(1103)4137.42(p)) |
| 4137.660 | 16.2 | 0.088 | 0.17 | 4137.662 | Ce II(2)4137.65(2000) |
| 4137.965 | 10.5 | 0.029 | 0.34 | 4137.967 | (Fe I(320)4137.970(p)) |
| 4138.386 | 16.6 | 0.060 | 0.26 | 4138.388 | (Fe II(39)4138.40(p)) |
| 4139.088 | 2.9 | 0.015 | 0.19 | 4139.090 | |
| 4139.934 | 21.6 | 0.102 | 0.20 | 4139.936 | Fe I(18)4139.9273(2) |
| 4140.407 | 18.7 | 0.088 | 0.20 | 4140.409 | Fe I(695)4140.4024((1)) |
| 4141.849 | 22.0 | 0.098 | 0.21 | 4141.851 | Fe I(422)4141.8633((1)) |
| 4142.204 | 16.4 | 0.074 | 0.21 | 4142.206 | Cr I(305)4142.192(45),Ni I(212) 4142.184((2)) |
| 4142.365 | 10.2 | 0.059 | 0.16 | 4142.367 | Ce II(10)4142.40(770),Ni I(-) 4142.320((4)) |
| 4142.552 | 29.6 | 0.113 | 0.25 | 4142.554 | Fe I(1103)4142.5889((1N)),Cr I(179) 4142.46(22) |
| 4142.942 | 3.6 | 0.021 | 0.16 | 4142.944 | |
| 4143.111 | 5.0 | 0.033 | 0.14 | 4143.113 | (Pr II(4)4143.136(150)) |
| 4143.435 | 111.0 | 0.458 | 0.23 | 4143.437 | Fe I(523)4143.4146(15) |
| 4143.875 | 145.3 | 0.553 | 0.25 | 4143.877 | Fe I(43)4143.8680(30) |
| 4144.451 | 5.7 | 0.027 | 0.20 | 4144.453 | Ce II(3)4144.49(390) |
| 4145.031 | 9.7 | 0.034 | 0.27 | 4145.033 | Ce II(9)4145.00(670) |
| 4145.210 | 3.3 | 0.022 | 0.14 | 4145.212 | Fe I(274)4145.1995((1)) |
| 4145.760 | 18.3 | 0.095 | 0.18 | 4145.762 | Cr II(162)4145.77(25) |
| 4146.080 | 30.3 | 0.108 | 0.26 | 4146.082 | Fe I(n)4146.0642((2)),Cr I(260) 4146.206(40) |
| 4146.994 | 12.2 | 0.065 | 0.18 | 4146.996 | |
| 4147.375 | 17.5 | 0.073 | 0.22 | 4147.377 | (Fe I(693)4147.3420(p)) |
| 4147.671 | 69.8 | 0.327 | 0.20 | 4147.673 | Fe I(42)4147.6690(10) |
| 4148.883 | 6.5 | 0.021 | 0.29 | 4148.885 | Mn I(C)4148.796(80) |
| 4149.211 | 60.0 | 0.282 | 0.20 | 4149.213 | Zr II(41)4149.22(75) |
| 4149.354 | 32.7 | 0.210 | 0.15 | 4149.356 | Fe I(694)4149.3650(5n) |
| 4149.450 | 22.7 | 0.118 | 0.18 | 4149.452 | Cr I(261)4149.453(30) |
| 4149.874 | 18.2 | 0.063 | 0.27 | 4149.876 | Ce II(158,189)4149.94(980) |
| 4150.248 | 35.0 | 0.167 | 0.20 | 4150.250 | Fe I(695)4150.2491((4)) |
| 4150.425 | 12.9 | 0.047 | 0.26 | 4150.427 | |

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| 4115.187 | 4.3 | 0.051 | 0.08 | 4115.185 | V I(27)4115.185(60) |

4135 Å Region

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| 4104.135 | 30.0 | 0.131 | 0.22 | 4104.137 | Fe I(558,356)4104.1136;1539(3) |
| 4105.045 | 5.4 | 0.019 | 0.27 | 4105.047 | (Fe I(700)4105.06(p)) |
| 4106.362 | 32.1 | 0.099 | 0.30 | 4106.364 | Fe I(697)4106.4229((1)) |
| 4107.490 | 63.3 | 0.291 | 0.20 | 4107.492 | Fe I(354)4107.4883(12),Ce II(MCS) 4107.42(510) |
| 4108.551 | 15.9 | 0.083 | 0.18 | 4108.553 | Ca I(39)4108.554(10N) |
| 4109.055 | 26.8 | 0.128 | 0.20 | 4109.057 | Fe I(558)4109.0561((1)) |
| 4109.476 | 15.2 | 0.077 | 0.18 | 4109.478 | Nd II(10)4109.455(2500),Cr I(65) 4109.58(40) |
| 4109.809 | 61.5 | 0.291 | 0.20 | 4109.811 | Fe I(357)4109.8017(9),V I(27) 4109.786(50) |
| 4110.521 | 15.2 | 0.067 | 0.21 | 4110.523 | Co I(29)4110.532(25) |
| 4110.971 | 33.1 | 0.131 | 0.24 | 4110.973 | Cr II(18,26)4111.00(18) |
| 4111.365 | 5.7 | 0.034 | 0.16 | 4111.367 | (Cr I(97)4111.36((6))) |
| 4111.788 | 19.6 | 0.096 | 0.19 | 4111.790 | V I(27)4111.785(100R) |
| 4112.330 | 14.5 | 0.068 | 0.20 | 4112.332 | Fe I(695)4112.3185((1)) |
| 4112.952 | 50.6 | 0.213 | 0.22 | 4112.954 | Fe I(1103)4112.9589(3n) |
| 4113.235 | 6.2 | 0.037 | 0.16 | 4113.237 | Cr II(18)4113.24(5),Mn I(C) 4113.243(30) |
| 4113.772 | 3.4 | 0.017 | 0.19 | 4113.774 | Ce II(137)4113.726((30)) |
| 4114.449 | 54.7 | 0.248 | 0.21 | 4114.451 | Fe I(357)4114.4450(5) |
| 4114.919 | 17.4 | 0.085 | 0.19 | 4114.921 | Fe I(695)4114.9376((1w)) |
| 4115.148 | 22.9 | 0.068 | 0.32 | 4115.150 | V I(27)4115.185(60) |
| 4115.947 | 8.8 | 0.039 | 0.21 | 4115.949 | Ni I(255)4115.982((3)) |
| 4116.469 | 4.3 | 0.023 | 0.17 | 4116.471 | V I(27)4116.470(50) |
| 4116.783 | 8.3 | 0.028 | 0.28 | 4116.785 | |
| 4116.991 | 3.5 | 0.029 | 0.12 | 4116.993 | Fe I(558)4116.970((1)) |
| 4117.838 | 15.5 | 0.084 | 0.17 | 4117.840 | Fe I(700)4117.8528((1)) |
| 4118.169 | 14.1 | 0.040 | 0.33 | 4118.171 | Ce II(11)4118.14(770) |
| 4118.539 | 77.0 | 0.373 | 0.19 | 4118.541 | Fe I(801)4118.5450(15),Sm II(54) 4118.55(1900) |
| 4118.805 | 89.9 | 0.297 | 0.28 | 4118.807 | Co I(28)4118.774(50) |
| 4119.457 | 29.5 | 0.099 | 0.28 | 4119.459 | (Fe II(21)4119.53(p)) |
| 4119.862 | 11.4 | 0.051 | 0.21 | 4119.864 | (Ce II(83)4119.877((20))) |
| 4120.207 | 54.2 | 0.237 | 0.22 | 4120.209 | Fe I(423)4120.2065(5) |
| 4120.543 | 2.9 | 0.014 | 0.20 | 4120.545 | Cr I(65)4120.621(50) |
| 4120.787 | 3.4 | 0.020 | 0.16 | 4120.789 | Ce II(112)4120.83(450) |
| 4121.320 | 64.2 | 0.294 | 0.20 | 4121.322 | Co I(28)4121.318(60),Cr I(K) 4121.261(30) |
| 4121.813 | 44.2 | 0.222 | 0.19 | 4121.815 | Cr I(108)4121.815(45),Fe I(356) 4121.8026(5) |
| 4122.528 | 52.2 | 0.250 | 0.20 | 4122.530 | Fe I(356)4122.5155(4) |
| 4122.677 | 40.9 | 0.221 | 0.17 | 4122.679 | Fe II(28)4122.638(4) |
| 4123.234 | 25.6 | 0.132 | 0.18 | 4123.236 | La II(41)4123.23(4400),Cr I(108) 4123.386(50) |
| 4123.458 | 10.2 | 0.056 | 0.17 | 4123.460 | Ce II(22)4123.49(510) |
| 4123.775 | 56.5 | 0.191 | 0.28 | 4123.777 | Fe I(422)4123.7283((1)),Ce II (MCS)4123.87(980) |
| 4124.488 | 4.6 | 0.023 | 0.19 | 4124.490 | |
| 4124.823 | 27.6 | 0.112 | 0.23 | 4124.825 | Fe II(22)4124.793(1),Ce II(MCS) 4124.79(510),Y II(14)4124.904 (359) |
| 4125.629 | 41.2 | 0.192 | 0.20 | 4125.631 | Fe I(1103)4125.6175((1)) |
| 4125.885 | 23.2 | 0.113 | 0.19 | 4125.887 | Fe I(354)4125.8804((2)) |
| 4126.183 | 50.9 | 0.244 | 0.20 | 4126.185 | Fe I((695)4126.1827(3n) |
| 4126.508 | 9.9 | 0.041 | 0.23 | 4126.510 | Cr I(35)4126.513(75) |
| 4126.821 | 10.1 | 0.040 | 0.23 | 4126.823 | Fe I(354)4126.8545((1)) |
| 4127.365 | 21.1 | 0.062 | 0.32 | 4127.367 | Ce II(4)4127.37(980).Cr I(35) 4127.297(40) |

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| 4082.429 | 19.8 | 0.086 | 0.22 | 4082.427 | Fe I(n)4082.4246((2)) |
| 4082.947 | 34.3 | 0.174 | 0.18 | 4082.945 | Mn I(5)4082.945(600) |
| 4083.214 | 8.7 | 0.047 | 0.17 | 4083.212 | Ce II(60)4083.23(910) |
| 4083.634 | 68.7 | 0.280 | 0.23 | 4083.632 | Mn I(5)4083.634(500) |
| 4083.800 | 14.3 | 0.091 | 0.15 | 4083.798 | Fe I(697)4083.7632((1)) |
| 4084.500 | 63.2 | 0.295 | 0.20 | 4084.498 | Fe I(698)4084.4915(6) |
| 4085.018 | 50.0 | 0.231 | 0.20 | 4085.016 | Fe I(358)4085.0041(4),Cr I(K) 4085.03(25) |
| 4085.300 | 63.9 | 0.301 | 0.20 | 4085.298 | Fe I(559)4085.3031(4),Ce II(172) 4085.232(100) |
| 4085.981 | 13.2 | 0.067 | 0.19 | 4085.979 | Fe I(1073*)4085.9842((1)) |
| 4086.117 | 6.8 | 0.061 | 0.11 | 4086.115 | Cr II(26)4086.14(8) |
| 4086.321 | 12.1 | 0.046 | 0.24 | 4086.319 | Co I(58)4086.300(15) |
| 4086.724 | 19.0 | 0.109 | 0.16 | 4086.722 | La II(10)4086.72(5500) |
| 4087.095 | 15.4 | 0.105 | 0.14 | 4087.093 | Fe I(694)4087.0939((1)) |
| 4087.212 | 13.7 | 0.059 | 0.22 | 4087.210 | (Fe II(28)4087.27(p)) |
| 4087.609 | 6.3 | 0.019 | 0.31 | 4087.607 | (Cr II(19)4087.63(2)) |
| 4088.576 | 14.5 | 0.081 | 0.17 | 4088.574 | Fe I(n)4088.5568((1)) |
| 4088.777 | 4.9 | 0.028 | 0.16 | 4088.775 | (Fe II(39)4088.75(p)) |
| 4089.012 | 7.6 | 0.026 | 0.27 | 4089.010 | |
| 4089.239 | 17.4 | 0.085 | 0.19 | 4089.237 | Fe I(422)4089.2169((1)) |
| 4090.070 | 19.4 | 0.072 | 0.25 | 4090.068 | Fe I(700)4090.0726((1)) |
| 4090.533 | 18.2 | 0.064 | 0.27 | 4090.531 | Zr II(29)4090.52(10),(V I(41) 4090.579(25)) |
| 4090.976 | 13.5 | 0.071 | 0.18 | 4090.974 | Fe I(695)4090.9535((1w)) |
| 4091.564 | 14.9 | 0.078 | 0.18 | 4091.562 | Fe I(357)4091.5531((1)) |
| 4092.371 | 51.4 | 0.166 | 0.29 | 4092.369 | Co I(29)4092.386(25),Mn I(C) 4092.388(40n) |
| 4092.650 | 25.1 | 0.123 | 0.19 | 4092.648 | Ca I(25)4092.633(8) |
| 4094.439 | 6.6 | 0.038 | 0.16 | 4094.437 | (Gd II(48)4094.478(300)) |
| 4094.936 | 26.8 | 0.125 | 0.20 | 4094.934 | Ca I(25)4094.930(12) |
| 4096.014 | 60.9 | 0.218 | 0.26 | 4096.012 | Fe I(217)4095.9707(4) |
| 4096.670 | 2.9 | 0.036 | 0.08 | 4096.668 | Zr II(15)4096.63(4) |
| 4097.070 | 16.4 | 0.074 | 0.21 | 4097.068 | Fe I(558)4097.0834((1)) |
| 4098.179 | 38.0 | 0.178 | 0.20 | 4098.177 | Fe I(558)4098.1758(4n) |
| 4098.550 | 30.3 | 0.132 | 0.22 | 4098.548 | (Cr II(K)4098.44(8)),Ca I(25) 4098.533(15),Gd II(49)4098.606 (3000) |
| 4100.176 | 7.2 | 0.047 | 0.14 | 4100.174 | Fe I(n)4100.17((3)) |
| 4100.721 | 12.6 | 0.078 | 0.15 | 4100.719 | Fe I(18)4100.7379(3) |
| 4101.752 | | | | 4101.750 | H-delta 4101.737 |
| 4102.955 | 27.4 | 0.150 | 0.17 | 4102.953 | Mn I(C)4102.970(30),Si I(2) 4102.936(70) |
| 4104.139 | 25.1 | 0.129 | 0.18 | 4104.137 | Fe I(558,356)4104.1136;.1539(3) |
| 4106.247 | 15.8 | 0.074 | 0.20 | 4106.245 | Fe I(217)4106.2587((1)) |
| 4106.450 | 19.1 | 0.093 | 0.19 | 4106.448 | Fe I(697)4106.4229((1)) |
| 4107.494 | 61.9 | 0.281 | 0.21 | 4107.492 | Fe I(354)4107.4883(12),Ce II(MCS) 4107.42(510) |
| 4108.161 | 3.1 | 0.039 | 0.08 | 4108.159 | (Fe I(559)4108.1330(p)) |
| 4108.560 | 17.8 | 0.074 | 0.22 | 4108.558 | Ca I(39)4108.554(10N) |
| 4109.049 | 27.5 | 0.130 | 0.20 | 4109.047 | Fe I(558)4109.00561((1)),Nd II(MCS) 4109.08(1400) |
| 4109.483 | 14.2 | 0.058 | 0.23 | 4109.481 | Nd II(10)4109.46(2500),Cr I(65) 4109.58(40) |
| 4109.811 | 59.5 | 0.274 | 0.20 | 4109.809 | Fe I(357)4109.8017(9),V I(27) 4109.786(50) |
| 4110.524 | 11.3 | 0.061 | 0.17 | 4110.522 | Co I(29)4110.532(25) |
| 4110.990 | 24.7 | 0.118 | 0.20 | 4110.988 | Cr II(18,26)4111.00(18) |
| 4111.790 | 14.4 | 0.075 | 0.18 | 4111.788 | V I(27)4111.785(100R) |
| 4112.333 | 10.7 | 0.061 | 0.16 | 4112.331 | Fe I(695)4112.3185((1)) |
| 4112.961 | 44.3 | 0.178 | 0.23 | 4112.959 | Fe I(1103)4112.9589(3n) |
| 4114.451 | 44.8 | 0.229 | 0.18 | 4114.449 | Fe I(357)4114.4450(5) |
| 4114.951 | 17.5 | 0.086 | 0.19 | 4114.949 | Fe I(695)4114.9376((1w)) |

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| 4062.449 | 68.7 | 0.312 | 0.21 | 4062.447 | Fe I(359)4062.4409(10) |
| 4062.766 | 9.8 | 0.039 | 0.23 | 4062.764 | (Pr II(26)4062.817(125)) |
| 4063.281 | 61.7 | 0.271 | 0.21 | 4063.279 | Fe I(698)4063.2757((3)) |
| 4063.600 | 185.7 | 0.635 | 0.27 | 4063.598 | Mn I(5)4063.530(400),Fe I(43) 4063.5942(45) |
| 4063.987 | 19.9 | 0.064 | 0.29 | 4063.985 | (Cr II(19)4063.94(p)) |
| 4064.409 | 29.9 | 0.096 | 0.29 | 4064.407 | Fe I(44)4064.4493((2)),Ni I(179) 4064.374(2) |
| 4065.125 | 14.5 | 0.060 | 0.23 | 4065.123 | Ti I(80)4065.094(30),Mn I(C) 4065.083(100),V II(215)4065.070 (100) |
| 4065.389 | 27.3 | 0.148 | 0.17 | 4065.387 | Fe I(698)4065.3812((2)) |
| 4066.154 | 5.4 | 0.036 | 0.14 | 4066.152 | Cr II(182)4066.16(p) |
| 4066.362 | 4.8 | 0.031 | 0.15 | 4066.360 | Co I(30)4066.365(15),Fe II(214) 4066.328(?2) |
| 4066.603 | 38.8 | 0.159 | 0.23 | 4066.601 | Fe I(424)4066.5852((1)) |
| 4066.992 | 78.7 | 0.369 | 0.20 | 4066.990 | Fe I(358*)4066.9742(6),Cr I(66) 4066.928(70),Ni II(11) 4067.051(3) |
| 4067.282 | 63.0 | 0.286 | 0.21 | 4067.280 | Fe I(217)4067.2712(4) |
| 4068.919 | 1.9 | 0.021 | 0.08 | 4068.917 | (Ti I(299)4068.981(4n)) |
| 4069.093 | 6.8 | 0.037 | 0.17 | 4069.091 | Fe I(557)4069.0678((1)) |
| 4070.278 | 13.2 | 0.056 | 0.22 | 4070.276 | Mn I(5)4070.280(200),(La II(MCS) 4067.39(350)) |
| 4070.779 | 56.7 | 0.270 | 0.20 | 4070.777 | (Ce II(82)4069.836(75)) |
| 4071.005 | 4.9 | 0.025 | 0.19 | 4071.003 | Cr II(193)4070.88(10),Cr I(306) 4070.991(30) |
| 4071.490 | 16.3 | 0.102 | 0.15 | 4071.488 | Fe I(218)4071.5201((1)) |
| 4071.741 | 179.5 | 0.578 | 0.29 | 4071.739 | Fe I(43)4071.7380(40),Ce II(81) 4071.81(1100) |
| 4072.529 | 29.8 | 0.137 | 0.20 | 4072.527 | Fe I(698)4072.5024((2)),Cr II(26) 4072.56(4) |
| 4073.522 | 15.5 | 0.045 | 0.33 | 4073.520 | Ce II(4)4073.48(1800) |
| 4073.762 | 45.1 | 0.248 | 0.17 | 4073.760 | Fe I(558)4073.7623(4n) |
| 4074.777 | 71.2 | 0.293 | 0.23 | 4074.775 | Fe I(524)4074.7858(5),Cr I(K) 4074.857(50) |
| 4075.128 | 17.8 | 0.070 | 0.24 | 4075.126 | Nd II(62)4075.12(710) |
| 4075.633 | 6.9 | 0.048 | 0.14 | 4075.631 | (Cr II(19)4075.63(p)),Ce II(57) 4075.71(1500) |
| 4075.933 | 48.6 | 0.194 | 0.24 | 4075.931 | (Cr I(66)4075.921(6)),Fe II(21) 4075.95(p),Ce II(206)4075.85 (1500),Cr I(279)4076.071(60) |
| 4076.246 | 15.2 | 0.099 | 0.14 | 4076.244 | Fe I(486)4076.2180((1)) |
| 4076.640 | 124.2 | 0.400 | 0.29 | 4076.638 | Fe I(558)4076.6291(8n) |
| 4076.865 | 22.3 | 0.191 | 0.11 | 4076.863 | Cr II(19)4076.87(3),Fe I(557) 4076.8000((1w)) |
| 4077.370 | 40.5 | 0.144 | 0.26 | 4077.368 | La II(41)4077.35(2800),Cr II(19) 4077.50(4) |
| 4077.734 | 194.6 | 0.646 | 0.28 | 4077.732 | Sr II(1)4077.714(400r),Cr I(279) 4077.679(60) |
| 4078.379 | 69.0 | 0.294 | 0.22 | 4078.377 | Fe I(217)4078.3539(4),(Ce II(MCS) 4078.32(530)) |
| 4078.834 | 3.3 | 0.020 | 0.15 | 4078.832 | |
| 4079.235 | 54.6 | 0.252 | 0.20 | 4079.233 | Fe I(700)4079.1681(3N),Mn I(5) 4079.241(500) |
| 4079.437 | 29.7 | 0.151 | 0.18 | 4079.435 | Mn I(5)4079.415(500) |
| 4079.851 | 50.0 | 0.213 | 0.22 | 4079.849 | Fe I(359)4079.8380(4) |
| 4080.220 | 37.6 | 0.191 | 0.19 | 4080.218 | Fe I(558)4080.2092(2n),Cr I(66) 4080.339(40) |
| 4080.885 | 15.1 | 0.087 | 0.16 | 4080.883 | Fe I(557)4080.8769((1w)) |
| 4081.240 | 13.7 | 0.074 | 0.17 | 4081.238 | Ce II(4)4081.22(670) |
| 4082.116 | 22.0 | 0.114 | 0.18 | 4082.114 | Fe I(698)4082.1079((1)),Cr II(165) 4082.30(10) |

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| | | | | | 4054.1771((1)) |
| 4054.437 | 6.6 | 0.038 | 0.16 | 4054.439 | |
| 4054.838 | 67.2 | 0.299 | 0.21 | 4054.840 | Fe I(698)4054.8056((1)),Fe I(698) 4054.8669(3) |
| 4055.043 | 48.7 | 0.209 | 0.22 | 4055.045 | Fe I(218)4055.0355(3) |
| 4055.565 | 58.9 | 0.279 | 0.20 | 4055.567 | Mn I(5)4055.548(1000h) |
| 4056.060 | 2.9 | 0.029 | 0.09 | 4056.062 | Cr II(182)4056.07(4),Cr I(K) 4056.047(50) |
| 4056.214 | 22.8 | 0.076 | 0.28 | 4056.216 | Ti II(11)4056.187(4) |
| 4056.451 | 14.1 | 0.053 | 0.25 | 4056.453 | Fe I(320)4056.53((1)) |
| 4057.518 | 166.2 | 0.444 | 0.35 | 4057.520 | Fe II(212)4057.457(2),Mg I(16) 4057.505(5n),Fe I(277) 4057.3435(2),Fe II(33)4057.51(4) |
| 4057.942 | 9.6 | 0.052 | 0.17 | 4057.944 | Mn I(29)4057.954(100h1) |
| 4058.237 | 50.7 | 0.243 | 0.20 | 4058.239 | Fe I(558)4058.2170(4n) |
| 4058.798 | 44.6 | 0.184 | 0.23 | 4058.800 | Fe I(120)4058.7539(3),Cr I(251) 4058.778(70) |
| 4058.963 | 26.1 | 0.145 | 0.17 | 4058.965 | Mn I(5)4058.936(500) |
| 4059.415 | 3.4 | 0.019 | 0.17 | 4059.417 | Mn I(29)4059.388(150bl) |
| 4059.747 | 23.2 | 0.119 | 0.18 | 4059.749 | Fe I(766)4059.7135(3) |
| 4060.753 | 4.4 | 0.023 | 0.18 | 4060.755 | |

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| 4049.793 | 3.9 | 0.021 | 0.17 | 4049.791 | Cr I(251)4049.783(5) |
| 4050.342 | 10.1 | 0.055 | 0.17 | 4050.340 | Zr II(43)4050.32(15) |
| 4050.672 | 17.2 | 0.086 | 0.19 | 4050.670 | |
| 4051.141 | 9.5 | 0.038 | 0.24 | 4051.139 | (Fe II(172)4051.21(p)),Nd II(MCS) 4051.15(850) |
| 4051.353 | 3.0 | 0.031 | 0.09 | 4051.351 | V II(215)4051.34(100) |
| 4051.928 | 48.8 | 0.220 | 0.21 | 4051.926 | Fe I(700)4051.9053((2)),Cr II(19) 4051.96(12) |
| 4052.304 | 13.9 | 0.087 | 0.15 | 4052.302 | Fe I(700)4052.2954((1)) |
| 4052.479 | 32.4 | 0.162 | 0.19 | 4052.477 | Mn I(48)4052.476(50),Fe I(563) 4052.4406((1)) |
| 4052.672 | 26.0 | 0.102 | 0.24 | 4052.670 | Fe I(524)4052.6531((1)) |
| 4053.263 | 15.8 | 0.083 | 0.18 | 4053.261 | (Gd II(-)4053.294(1000)) |
| 4053.442 | 17.6 | 0.048 | 0.34 | 4053.440 | (Cr II(19)4053.43(1)) |
| 4053.824 | 55.2 | 0.292 | 0.18 | 4053.822 | Fe I(485)4053.82((1)),Ti II(87) 4053.829(11) |
| 4054.103 | 33.2 | 0.118 | 0.27 | 4054.101 | Cr II(19)4054.10(8),Fe I(557) 4054.1771((1)) |
| 4054.476 | 5.2 | 0.033 | 0.15 | 4054.474 | |
| 4054.834 | 69.3 | 0.309 | 0.21 | 4054.832 | Fe I(698)4054.8056((1)),Fe I(698) 4054.8669(3) |
| 4055.047 | 42.2 | 0.196 | 0.20 | 4055.045 | Fe I(218)4055.0355(3) |
| 4055.547 | 57.3 | 0.270 | 0.20 | 4055.545 | Mn I(5)4055.548(1000h) |
| 4056.224 | 22.4 | 0.074 | 0.29 | 4056.222 | Ti II(11)4056.187(4) |
| 4056.456 | 4.1 | 0.035 | 0.11 | 4056.454 | Fe I(320)4056.53((1)) |
| 4056.859 | 1.8 | 0.029 | 0.06 | 4056.857 | |
| 4057.499 | 162.1 | 0.432 | 0.35 | 4057.497 | Fe II(212)4057.457(2),Mg I(16) 4057.505(5n),Fe I(277) 4057.3435(2),Fe II(33)4057.51(4) |
| 4057.941 | 13.3 | 0.057 | 0.22 | 4057.939 | Mn I(29)4057.954(100h1) |
| 4058.221 | 46.4 | 0.232 | 0.19 | 4058.219 | Fe I(558)4058.2170(4n) |
| 4058.793 | 48.0 | 0.186 | 0.24 | 4058.791 | Fe I(120)4058.7539(3),Cr I(251) 4058.778(70) |
| 4058.941 | 19.9 | 0.121 | 0.15 | 4058.939 | Mn I(5)4058.936(500) |
| 4059.433 | 2.4 | 0.028 | 0.08 | 4059.431 | Mn I(29)4059.388(150bl) |
| 4059.723 | 22.7 | 0.143 | 0.15 | 4059.721 | Fe I(766)4059.7135(3) |
| 4061.106 | 24.7 | 0.132 | 0.18 | 4061.104 | Nd II(10)4061.09(4700) |
| 4061.719 | 8.7 | 0.050 | 0.16 | 4061.717 | Mn I(29)4061.737(200h1) |
| 4061.955 | 21.6 | 0.098 | 0.21 | 4061.953 | |

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| | | | | | 4032.946(3) |
| 4033.616 | 5.5 | 0.027 | 0.19 | 4033.618 | |
| 4034.139 | 8.6 | 0.035 | 0.23 | 4034.141 | Zr II(42)4034.10(5) |
| 4034.489 | 105.0 | 0.473 | 0.21 | 4034.491 | Mn I(2)4034.485(10000Rw) |
| 4035.180 | 4.7 | 0.028 | 0.16 | 4035.182 | Sm II(33)4035.110(250) |
| 4035.668 | 104.6 | 0.381 | 0.26 | 4035.670 | V II(32)4035.631(400),Mn I(5) 4035.729(1000) |
| 4036.330 | 2.3 | 0.018 | 0.12 | 4036.332 | (Fe I(279)4036.3665(p)) |
| 4036.763 | 12.9 | 0.077 | 0.16 | 4036.765 | V II(9)4036.779(60) |
| 4037.147 | 9.5 | 0.040 | 0.22 | 4037.149 | |
| 4037.979 | 2.2 | 0.020 | 0.10 | 4037.981 | Gd II(49)4037.897(1200),Cr II(194) 4038.02(25) |
| 4038.770 | 25.2 | 0.087 | 0.27 | 4038.772 | |
| 4039.094 | 7.6 | 0.059 | 0.12 | 4039.096 | Cr I(251)4039.098(60) |
| 4040.088 | 28.6 | 0.120 | 0.22 | 4040.090 | |
| 4040.679 | 61.2 | 0.234 | 0.25 | 4040.681 | Fe I(655)4040.6381(4),Ce II(138) 4040.76(2100),Nd II(30)4040.80 (3000) |
| 4041.344 | 98.8 | 0.428 | 0.22 | 4041.346 | Mn I(5)4041.357(2000h),Fe I (603,654) 4041.2717((1)) |
| 4041.646 | 15.3 | 0.084 | 0.17 | 4041.648 | (Fe II(172)4041.64(p)) |
| 4042.605 | 5.7 | 0.029 | 0.19 | 4042.607 | Ce II(140)4042.58(910) |
| 4042.906 | 11.2 | 0.066 | 0.16 | 4042.908 | Sm II(9)4042.90(880),La II(66) 4042.91(300) |
| 4043.674 | 5.0 | 0.026 | 0.18 | 4043.676 | Cr I(306)4043.684(50) |
| 4043.927 | 78.6 | 0.322 | 0.23 | 4043.929 | Fe I(557)4043.8966(5n) |
| 4044.600 | 76.8 | 0.309 | 0.23 | 4044.602 | Fe I(359)4044.6092(6) |
| 4045.191 | 56.5 | 0.136 | 0.39 | 4045.193 | Mn I(48)4045.115(50),Fe I(n) 4045.1119((1)),Mn I(-)4045.203 (50) |
| 4045.617 | 105.3 | 0.356 | 0.28 | 4045.619 | Zr II(30)4045.63(15) |
| 4045.833 | 160.5 | 0.618 | 0.24 | 4045.835 | Fe I(43)4045.8124(60r) |
| 4046.056 | 59.3 | 0.257 | 0.22 | 4046.058 | (Fe I(557)4046.0623(p)) |
| 4046.331 | 28.7 | 0.072 | 0.38 | 4046.333 | Ce II(81)4046.34(620),V II(177) 4046.269(50) |
| 4046.856 | 7.8 | 0.019 | 0.38 | 4046.858 | Fe II(126)4046.81(p),Cr I(36) 4046.758(35) |
| 4047.252 | 6.6 | 0.033 | 0.19 | 4047.254 | Fe I(117)4047.3040((1)) |
| 4047.692 | 9.5 | 0.034 | 0.26 | 4047.694 | |
| 4047.990 | 2.9 | 0.017 | 0.16 | 4047.992 | |
| 4048.742 | 78.5 | 0.328 | 0.23 | 4048.744 | Mn I(5)4048.747(1000h),Zr II(43) 4048.68(25),Cr I(250)4048.784 (60),Fe II(172)4048.831(3) |
| 4049.069 | 8.1 | 0.034 | 0.22 | 4049.071 | Cr II(193)4049.14(18),Mn I(48) 4048.998(40) |
| 4049.344 | 23.6 | 0.090 | 0.25 | 4049.346 | Fe I(218)4049.3270((1)) |
| 4049.751 | 5.1 | 0.026 | 0.19 | 4049.753 | Cr I(251)4049.779(40) |
| 4050.335 | 9.2 | 0.067 | 0.13 | 4050.337 | Zr II(43)4050.32(15) |
| 4050.480 | 3.6 | 0.038 | 0.09 | 4050.482 | |
| 4050.670 | 20.0 | 0.104 | 0.18 | 4050.672 | |
| 4051.179 | 13.6 | 0.048 | 0.26 | 4051.181 | (Fe II(172)4051.21(p)),Nd II(MCS) 4051.15(850) |
| 4051.938 | 49.7 | 0.228 | 0.21 | 4051.940 | Fe I(700)4051.9053((2)),Cr II(19) 4051.96(12) |
| 4052.379 | 32.5 | 0.118 | 0.26 | 4052.381 | Fe I(700)4052.2954((1)) |
| 4052.500 | 9.7 | 0.083 | 0.11 | 4052.502 | Mn I(48)4052.476(50),Fe I(563) 4052.4606((1)) |
| 4052.663 | 31.7 | 0.101 | 0.29 | 4052.665 | Fe I(524)4052.6531((1)) |
| 4053.272 | 8.0 | 0.063 | 0.12 | 4053.274 | (Gd II(-)4053.294(1000)) |
| 4053.355 | 26.4 | 0.067 | 0.37 | 4053.357 | (Cr II(19)4053.45(1)) |
| 4053.839 | 61.3 | 0.301 | 0.19 | 4053.841 | Fe I(485)4053.82((1)),Ti II(87) 4053.829(11) |
| 4054.124 | 30.3 | 0.123 | 0.23 | 4054.126 | Cr II(19)4054.10(8),Fe I(557) |

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| 4017.817 | 5.1 | 0.030 | 0.16 | 4017.819 | Ti I(185)4017.771(15n) |
| 4018.089 | 50.6 | 0.232 | 0.20 | 4018.091 | Mn I(57)4018.106(1000h) |
| 4018.267 | 52.7 | 0.210 | 0.24 | 4018.269 | Fe I(560)4018.2675((4)),Cr I(K) 4018.216(35) |
| 4018.920 | 2.8 | 0.037 | 0.07 | 4018.922 | |
| 4019.052 | 9.3 | 0.065 | 0.14 | 4019.054 | Ni I(72)4019.055((3)),Fe I(219) 4019.0420((1)) |
| 4019.430 | 3.2 | 0.018 | 0.17 | 4019.432 | |
| 4019.867 | 2.2 | 0.014 | 0.15 | 4019.869 | |
| 4020.065 | 10.0 | 0.059 | 0.16 | 4020.067 | |
| 4020.264 | 26.0 | 0.109 | 0.22 | 4020.266 | |
| 4020.475 | 12.5 | 0.062 | 0.19 | 4020.477 | Fe I(913)4020.4836((1)) |
| 4020.902 | 13.5 | 0.067 | 0.19 | 4020.904 | Co I(16)4020.898(20),Nd II(MCS) 4020.87(1000) |
| 4021.318 | 8.4 | 0.043 | 0.19 | 4021.320 | Nd II(36)4021.34(1000) |
| 4021.605 | 14.6 | 0.073 | 0.19 | 4021.607 | Fe I(120)4021.6028((1)) |
| 4021.865 | 84.1 | 0.383 | 0.21 | 4021.867 | Ti I(185)4021.812(25n),Fe I(278) 4021.8665(12),Nd II(MCS) 4021.78(1000) |
| 4022.195 | 17.7 | 0.062 | 0.27 | 4022.197 | Cr I(268)4022.27(50) |
| 4022.458 | 5.1 | 0.012 | 0.40 | 4022.460 | Fe I(173)4022.45((1)) |
| 4022.764 | 17.7 | 0.077 | 0.21 | 4022.766 | Fe I(556,654)4022.7358((1)) |
| 4023.031 | 9.3 | 0.044 | 0.20 | 4023.033 | Nd II(-)4023.00(1200) |
| 4023.384 | 49.8 | 0.231 | 0.20 | 4023.386 | V II(32)4023.388(600) |
| 4023.708 | 10.0 | 0.047 | 0.20 | 4023.710 | Cr I(268)4023.74(40) |
| 4024.077 | 27.5 | 0.107 | 0.24 | 4024.079 | Fe I(277)4024.0963((1)) |
| 4024.537 | 43.6 | 0.183 | 0.22 | 4024.539 | Fe II(127)4024.552(5),Cr I(K) 4024.564(20),Ti I(12)4024.573 (35)4024.49(840) |
| 4024.728 | 69.0 | 0.307 | 0.21 | 4024.730 | Fe I(560)4024.7250(6n) |
| 4025.132 | 72.8 | 0.341 | 0.20 | 4025.134 | Ti II(11)4025.120(13),Ni I(240) 4025.114((3)),Cr I(37)4025.013 (50) |
| 4025.425 | 11.5 | 0.053 | 0.20 | 4025.427 | Ni I(117)4025.44((1N)),Cr I(37) 4025.013(50) |
| 4025.834 | 19.0 | 0.089 | 0.20 | 4025.836 | (La II(42)4025.87(50)) |
| 4026.192 | 5.4 | 0.031 | 0.16 | 4026.194 | Cr I(37)4026.174(60) |
| 4026.478 | 10.6 | 0.050 | 0.20 | 4026.480 | Mn I(-)4026.437(80),Ti I(185) 4026.439(25n) |
| 4027.083 | 3.8 | 0.029 | 0.12 | 4027.085 | Cr I(37)4027.102(55),Co I(3) 4027.032(10) |
| 4027.678 | 8.5 | 0.042 | 0.19 | 4027.680 | |
| 4028.351 | 70.9 | 0.349 | 0.19 | 4028.353 | Ti II(87)4028.355(12),Ce II(47) 4028.41(840) |
| 4028.746 | 6.4 | 0.043 | 0.14 | 4028.748 | |
| 4029.644 | 58.4 | 0.282 | 0.19 | 4029.646 | Fe I(556)4029.6293(3n),Zr II(41) 4029.68(20),Ti II(87)4029.681(4) |
| 4030.211 | 31.8 | 0.138 | 0.22 | 4030.213 | Fe I(72)4030.1849((3)) |
| 4030.481 | 71.7 | 0.355 | 0.19 | 4030.483 | Fe I(560)4030.4885((6)),Ti I(185) 4030.512(25n) |
| 4030.766 | 154.6 | 0.579 | 0.25 | 4030.768 | Mn I(2)4030.755(20000Rw),Cr I(K) 4030.69(40) |
| 4031.278 | 19.1 | 0.040 | 0.45 | 4031.280 | Fe I(486)4031.2402((2)),Ce II(108) 4031.34(840),Cr I(268)4031.125 (25) |
| 4031.732 | 32.7 | 0.152 | 0.20 | 4031.734 | Fe I(427)4031.7280(2)),La II(40) 4031.69(2800),Nd II(-)4031.82 (1200),Mn I(C)4031.79(100) |
| 4031.961 | 42.8 | 0.219 | 0.18 | 4031.963 | Fe I(655)4031.9607(4) |
| 4032.435 | 16.9 | 0.118 | 0.13 | 4032.437 | Fe I(n)4032.4559((1)) |
| 4032.624 | 70.0 | 0.291 | 0.23 | 4032.626 | Fe I(44)4032.6275(4) |
| 4033.069 | 137.3 | 0.538 | 0.24 | 4033.071 | Mn I(2)4033.068(15000Rw),Fe II(126) |

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| | | | | | | 3999.195(30) |
| 4000.257 | 24.8 | 0.121 | 0.19 | 4000.259 | Fe I(556)4000.2522((1)) |
| 4000.461 | 41.5 | 0.205 | 0.19 | 4000.463 | Fe I(426)4000.4572(2) |
| 4001.069 | 3.5 | 0.021 | 0.16 | 4001.071 | |
| 4001.199 | 12.0 | 0.053 | 0.21 | 4001.201 | |
| 4001.433 | 13.7 | 0.099 | 0.13 | 4001.435 | Cr I(268)4001.443(75) |
| 4001.658 | 56.7 | 0.252 | 0.21 | 4001.660 | Fe I(72)4001.6617(5) |
| 4002.073 | 25.4 | 0.123 | 0.19 | 4002.075 | Fe II(29)4002.037(2) |
| 4002.436 | 8.2 | 0.032 | 0.24 | 4002.438 | Ti I(188)4002.466(9n) |
| 4002.507 | 2.4 | 0.023 | 0.10 | 4002.509 | Cr II(166)4002.48(5),Fe II(190) 4002.549(3) |
| 4002.646 | 7.0 | 0.045 | 0.15 | 4002.648 | Fe I(655)4002.6609((1)) |
| 4002.924 | 27.6 | 0.152 | 0.17 | 4002.926 | V II(9)4002.940(80) |
| 4003.094 | 2.4 | 0.020 | 0.11 | 4003.096 | |
| 4003.245 | 3.6 | 0.029 | 0.12 | 4003.247 | Cr II(194)4003.23(25) |
| 4003.764 | 29.1 | 0.157 | 0.17 | 4003.766 | Fe I(728)4003.7619(2),Ce II(188) 4003.77(910),Ti I(188)4003.789 (10n) |
| 4003.982 | 11.7 | 0.031 | 0.35 | 4003.984 | Cr I(268)4003.916(30) |
| 4004.898 | 97.4 | 0.379 | 0.24 | 4004.900 | Fe I(486)4004.9785((1)),Fe I(601) 4004.8275((1)) |
| 4005.253 | 157.2 | 0.539 | 0.27 | 4005.255 | Fe I(43)4005.2420(25) |
| 4005.692 | 63.4 | 0.277 | 0.21 | 4005.694 | V II(32)4005.712(800) |
| 4006.189 | 19.3 | 0.087 | 0.21 | 4006.191 | (Fe I(564)4006.1676(p)),Ni I(-) 4006.136(3) |
| 4006.322 | 35.4 | 0.207 | 0.16 | 4006.324 | Fe I(603)4006.3108(3) |
| 4006.691 | 84.9 | 0.279 | 0.29 | 4006.693 | Fe I(488)4006.6242(2) |
| 4007.275 | 52.9 | 0.259 | 0.19 | 4007.277 | Fe I(277)4007.2721(6),Fe I(119) 4007.233(ign) |
| 4007.934 | 14.1 | 0.062 | 0.21 | 4007.936 | |
| 4008.130 | 6.2 | 0.040 | 0.14 | 4008.132 | V II(32)4008.17(20) |
| 4008.891 | 38.0 | 0.163 | 0.22 | 4008.893 | Ti I(12)4008.926(35) |
| 4009.141 | 11.1 | 0.078 | 0.13 | 4009.143 | |
| 4009.716 | 75.9 | 0.343 | 0.21 | 4009.718 | Fe I(72)4009.7128(10),Ti I(11) 4009.653(16) |
| 4010.147 | 10.4 | 0.026 | 0.38 | 4010.149 | Fe I(n)4010.1763((1)) |
| 4010.588 | 25.9 | 0.123 | 0.20 | 4010.590 | |
| 4010.885 | 20.7 | 0.073 | 0.27 | 4010.887 | Fe I(219)4010.7481((1)) |
| 4011.410 | 13.0 | 0.074 | 0.16 | 4011.412 | Fe I(218)4011.4075((1)) |
| 4011.734 | 8.8 | 0.050 | 0.17 | 4011.736 | Fe I(156)4011.7113((1)) |
| 4012.385 | 124.6 | 0.438 | 0.27 | 4012.387 | Nd II(10)4102.25(3700),Ti II(11) 4012.396(15),Ce II(206)4019.39 (2700),Fe II(126)4012.416(1),Cr I(268)4012.48(50),Cr II(183) 4012.50(30) |
| 4012.728 | 3.8 | 0.022 | 0.16 | 4012.730 | (Nd II(-)4012.704(50)) |
| 4013.610 | 20.1 | 0.106 | 0.18 | 4013.612 | Ti I(187)4013.587(12n),Fe I(557) 4013.6395((2)) |
| 4013.811 | 55.8 | 0.241 | 0.22 | 4013.813 | Fe I(485)4013.7818((1)),Fe I(486) 4013.8248((1)) |
| 4014.251 | 9.6 | 0.048 | 0.19 | 4014.253 | Fe I(426)4014.2652((1)) |
| 4014.527 | 85.3 | 0.399 | 0.20 | 4014.529 | Fe In)4014.5308(10),Sc II(8) 4014.489(5),Cr I(268)41014.673 (40) |
| 4014.917 | 10.6 | 0.036 | 0.28 | 4014.919 | Ce II(157)4014.90(910) |
| 4015.404 | 2.6 | 0.018 | 0.13 | 4015.406 | Ti I(185)4015.377(12n) |
| 4015.585 | 52.8 | 0.209 | 0.24 | 4015.587 | Ni II(12)4015.50(1) |
| 4015.919 | 3.0 | 0.022 | 0.13 | 4015.921 | |
| 4016.418 | 28.8 | 0.136 | 0.20 | 4016.420 | Fe I(560)4016.4194((2)) |
| 4016.832 | 7.0 | 0.027 | 0.25 | 4016.834 | Cr I(K)4016.824(30) |
| 4017.133 | 79.1 | 0.355 | 0.21 | 4017.135 | Fe I(279)4017.0835((1)),Fe I(527) 4017.1485(6) |
| 4017.490 | 50.0 | 0.189 | 0.25 | 4017.492 | Ni I(171)4017.56(6n) |

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| 3987.048 | 55.2 | 0.137 | 0.38 | 3987.043 | Ni I(137)3987.090((2)),Mn I(33) 3987.092(100)),Co I(16) 3987.117(6) |
| 3987.365 | 6.9 | 0.036 | 0.18 | 3987.360 | |
| 3987.617 | 34.6 | 0.177 | 0.18 | 3987.612 | Ti II(11)3987.614(5) |
| 3988.520 | 27.7 | 0.123 | 0.21 | 3988.515 | La II(40)3988.52(4400) |
| 3989.041 | 37.9 | 0.158 | 0.23 | 3989.036 | Sc II(8)3989.06(2) |
| 3989.819 | 91.1 | 0.349 | 0.25 | 3989.814 | V II(32)3989.803(15),Fe I(n) 3989.8572((2d)),Ti I(12) 3989.758(80r) |
| 3990.120 | 13.9 | 0.070 | 0.19 | 3990.115 | Nd II(19)3990.10(1400) |
| 3990.391 | 38.6 | 0.179 | 0.20 | 3990.386 | Fe I(527)3990.3733(2) |
| 3991.134 | 48.8 | 0.247 | 0.19 | 3991.129 | Cr I(38)3991.118(25),Zr II(30) 3991.14(40) |
| 3991.411 | 11.7 | 0.054 | 0.20 | 3991.406 | |
| 3991.698 | 19.7 | 0.079 | 0.24 | 3991.693 | Co I(17)3991.684(6),Cr I(38) 3991.677(50),Nd II(19)3991.74 (1000) |
| 3992.288 | 21.2 | 0.082 | 0.24 | 3992.283 | Ce II(134)3992.39(700) |
| 3992.826 | 15.5 | 0.086 | 0.17 | 3992.821 | V I(89)3992.801(12),Cr I(67) 3992.846(100) |
| 3993.100 | 10.8 | 0.059 | 0.17 | 3993.095 | |
| 3993.654 | 5.2 | 0.038 | 0.13 | 3993.649 | |
| 3993.967 | 30.3 | 0.099 | 0.29 | 3993.962 | Ni I(170)3993.952(3n),Cr I(67) 3993.97(50),Ce II(MCS)3993.82 (910) |
| 3994.135 | 29.2 | 0.156 | 0.18 | 3994.130 | Fe I(526)3994.1132(2) |
| 3994.584 | 18.1 | 0.057 | 0.30 | 3994.579 | Co I(17)3994.542(6) |
| 3994.755 | 5.6 | 0.047 | 0.11 | 3994.750 | Nd II(-)3994.68(1100) |
| 3995.298 | 72.5 | 0.322 | 0.21 | 3995.293 | Fe I(n)3995.2047((1w)),Co I(31) 3995.306(60) |
| 3995.745 | 17.6 | 0.092 | 0.18 | 3995.740 | La II(27)3995.75(3600) |
| 3995.987 | 47.1 | 0.224 | 0.20 | 3995.982 | Fe I(279)3995.9835(4) |
| 3996.261 | 11.0 | 0.056 | 0.19 | 3996.256 | (Fe I(561)3996.9639(p)) |
| 3996.502 | 4.2 | 0.026 | 0.15 | 3996.497 | |
| 3996.785 | 6.1 | 0.049 | 0.12 | 3996.780 | (Fe I(1074)3996.79(p)) |
| 3997.032 | 74.6 | 0.237 | 0.30 | 3997.027 | Fe I(945)3996.9639(2) |
| 3997.414 | 107.7 | 0.433 | 0.23 | 3997.409 | Fe I(278)3997.3922(15) |
| 3998.026 | 109.3 | 0.364 | 0.28 | 3998.021 | Fe I(276)3998.0527(10),Co I(32) 3997.901(40) |
| 3998.642 | 72.4 | 0.285 | 0.24 | 3998.637 | Ti I(12)3998.635(100R) |
| 3998.979 | 34.7 | 0.184 | 0.18 | 3998.974 | Zr II(16)3998.98(30) |
| 3999.239 | 19.8 | 0.065 | 0.29 | 3999.234 | Ce II(57)3999.24(2800),V II(202) 3999.195(30) |
| 3999.645 | 4.1 | 0.028 | 0.14 | 3999.640 | Cr I(-)3999.679(40) |

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| 3994.492 | 3.9 | 0.022 | 0.17 | 3994.494 | Co I(17)3994.542(6) |
| 3994.705 | 15.6 | 0.060 | 0.24 | 3994.707 | Nd II(-)3994.68(1100) |
| 3995.297 | 76.4 | 0.345 | 0.21 | 3995.299 | Fe I(n)3995.2047((1w)),Co I(31) 3995.306(60) |
| 3995.761 | 18.5 | 0.098 | 0.18 | 3995.763 | La II(27)3995.75(3600) |
| 3995.992 | 47.2 | 0.232 | 0.19 | 3995.994 | Fe I(279)3995.9835(4) |
| 3996.267 | 9.4 | 0.045 | 0.20 | 3996.269 | (Fe I(561)3996.26(p)) |
| 3996.721 | 2.1 | 0.018 | 0.11 | 3996.723 | (Fe I(1074)3996.79(p) |
| 3997.025 | 69.5 | 0.217 | 0.30 | 3997.027 | Fe I(945)3996.9639(2) |
| 3997.415 | 99.8 | 0.442 | 0.21 | 3997.417 | Fe I(278)3997.3922(15) |
| 3997.928 | 38.4 | 0.175 | 0.21 | 3997.930 | Co I(32)3997.901(40) |
| 3998.067 | 58.2 | 0.312 | 0.18 | 3998.069 | Fe I(276)3998.0527(10) |
| 3998.638 | 65.3 | 0.296 | 0.21 | 3998.640 | Ti I(12)3998.635(100R) |
| 3998.979 | 34.0 | 0.183 | 0.17 | 3998.981 | Zr II(16)3998.980(30) |
| 3999.248 | 13.6 | 0.070 | 0.18 | 3999.250 | Ce II(57)3999.24(2800),V II(202) |

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| 3971.333 | 29.8 | 0.144 | 0.19 | 3971.328 | Fe I(277)3971.3227(9),Sm II(43) 3971.397(300),Cr I(67)3971.266 (75) |
| 3971.771 | 3.4 | 0.036 | 0.09 | 3971.766 | Fe I(281)3971.82((1)) |
| 3972.109 | 9.5 | 0.039 | 0.23 | 3972.104 | Eu II(5)3971.96(30000) |
| 3972.626 | 1.9 | 0.018 | 0.10 | 3972.621 | Cr I(67)3972.694(50) |
| 3972.946 | 3.6 | 0.036 | 0.09 | 3972.941 | Fe I(803)3972.9155((1)) |
| 3973.251 | 4.4 | 0.035 | 0.12 | 3973.246 | Nd II(19)3973.30(1100) |
| 3973.649 | 95.4 | 0.345 | 0.26 | 3973.644 | V II(9)3973.642(300),Fe I(769) 3973.6493(3),Ni I(31)3973.562 (25),Ca I(6)3973.707(12) |
| 3974.167 | 23.9 | 0.119 | 0.19 | 3974.162 | Fe II(29)3974.160(3) |
| 3974.402 | 10.9 | 0.073 | 0.14 | 3974.397 | Fe I(564)3974.3807((1)) |
| 3974.717 | 31.0 | 0.104 | 0.28 | 3974.712 | Co I(18)3974.726(10),Ni I(198) 3974.650(10n) |
| 3975.249 | 8.5 | 0.038 | 0.21 | 3975.244 | Fe I(156)3975.2055((1)) |
| 3975.844 | 10.2 | 0.066 | 0.14 | 3975.839 | Fe I(n)3975.8412((1)),Mn I(C) 3975.880(40) |
| 3976.101 | 16.4 | 0.077 | 0.20 | 3976.096 | (Cr I(38)3976.018(20)) |
| 3976.396 | 11.8 | 0.065 | 0.17 | 3976.391 | Fe I(487*)3976.3856((2)) |
| 3976.635 | 76.4 | 0.344 | 0.21 | 3976.630 | Fe I(729)3976.6132(4),Cr I(38) 3976.674(200R),Fe I(655) 3876.5463((1)) |
| 3976.869 | 37.9 | 0.147 | 0.24 | 3976.864 | Fe I(431*,662)3976.8612((1)),Mn I(C) 3977.076(50) |
| 3977.535 | 2.3 | 0.018 | 0.12 | 3977.530 | |
| 3977.756 | 68.4 | 0.327 | 0.20 | 3977.751 | Fe I(72)3977.7410(12),V II(10) 3977.732(60) |
| 3978.262 | 4.2 | 0.014 | 0.28 | 3978.257 | |
| 3978.428 | 9.5 | 0.075 | 0.12 | 3978.423 | Fe I(361)3978.4564((1)) |
| 3978.650 | 24.4 | 0.109 | 0.21 | 3978.645 | Co I(17)3978.650(10),Ce II(175) 3978.65(770),Cr I(67)3978.683 (75),Nd II(57)3979.479(60) |
| 3979.572 | 27.9 | 0.105 | 0.25 | 3979.567 | Co I(3)3979.518(10),Cr II(183) 3979.52(20),Fe I(561) 3979.65 ((1)) |
| 3980.696 | 3.4 | 0.023 | 0.14 | 3980.691 | Fe I(153)3980.65((1)) |
| 3981.006 | 9.6 | 0.043 | 0.21 | 3981.001 | |
| 3981.243 | 4.8 | 0.032 | 0.14 | 3981.238 | Cr I(67)3981.242(100) |
| 3981.626 | 21.6 | 0.090 | 0.23 | 3981.621 | Fe II(3)3981.61(p) |
| 3981.782 | 50.3 | 0.289 | 0.16 | 3981.777 | Fe I(278)3981.7711(7),Ti I(12) 3981.761(70r) |
| 3981.986 | 53.2 | 0.223 | 0.22 | 3981.981 | (Ti II(11)3981.986(1)),Cr I(K) 3981.93(20) |
| 3982.408 | 2.3 | 0.031 | 0.07 | 3982.403 | Ti II(11)3982.478(30) |
| 3982.596 | 56.7 | 0.248 | 0.21 | 3982.591 | Y II(6)3982.592(1056),Mn I(33) 3982.576(100) |
| 3982.995 | 7.9 | 0.038 | 0.20 | 3982.990 | Mn I(-)3982.900(40) |
| 3983.285 | 7.6 | 0.034 | 0.21 | 3983.280 | Cr I(213)3983.236(25),Fe I(485) 3983.35((1)) |
| 3983.575 | 11.1 | 0.066 | 0.16 | 3983.570 | |
| 3983.945 | 93.2 | 0.406 | 0.22 | 3983.940 | Fe I(277)3983.9564(10),Cr I(38) 3983.901(125r) |
| 3984.169 | 17.5 | 0.097 | 0.17 | 3984.164 | Mn I(33)3984.177((1)),Ni I(171) 3984.140(8n) |
| 3984.358 | 11.8 | 0.064 | 0.17 | 3984.353 | Cr I(38)3984.339(75) |
| 3984.685 | 14.4 | 0.087 | 0.16 | 3984.680 | Ce II(252)3984.68(770) |
| 3984.972 | 3.3 | 0.026 | 0.12 | 3984.967 | (Fe I(561)3984.9340(p)) |
| 3985.378 | 48.6 | 0.219 | 0.21 | 3985.373 | Fe I(661)3985.3873(3) |
| 3986.184 | 52.9 | 0.261 | 0.19 | 3986.179 | Fe I(655)3986.1717(5) |
| 3986.490 | 16.9 | 0.051 | 0.31 | 3986.485 | |
| 3986.762 | 91.1 | 0.391 | 0.22 | 3986.757 | (Mg I(17)3986.753((1))),Mn I(33) 3986.822(200) |

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| | | | | | 3948.862(35),Ca I(6)3948.901(6) |
| 3949.116 | 57.2 | 0.252 | 0.21 | 3949.111 | La II(41)3949.10(9000) |
| 3949.961 | 74.7 | 0.363 | 0.19 | 3949.956 | Fe I(72)3949.9530(10) |
| 3950.365 | 53.3 | 0.249 | 0.20 | 3950.360 | Y II(6)3950.349(1100s) |
| 3951.166 | 71.4 | 0.342 | 0.20 | 3951.161 | Fe I(661)3951.1632(9),Nd II(19) 3951.16(2000),Cr I(136) 3951.094(35w) |
| 3951.668 | 6.5 | 0.032 | 0.19 | 3951.663 | Y II(16)3951.590(73) |
| 3951.965 | 46.4 | 0.239 | 0.18 | 3951.960 | V II(10)3951.968(500) |
| 3952.213 | 10.6 | 0.037 | 0.27 | 3952.208 | Nd II(23)3952.20(810) |
| 3952.640 | 106.2 | 0.425 | 0.23 | 3952.635 | Fe I(278)3952.6015(8),Fe I(362) 3952.6958((1)),Ce II(113,177) 3952.54(3100) |
| 3952.925 | 32.9 | 0.130 | 0.24 | 3952.920 | Mn I(C)3952.842(100),Co I(28) 3952.917(25) |
| 3953.156 | 59.7 | 0.277 | 0.20 | 3953.151 | Fe I(430)3953.1514(4),Cr I(136) 3953.17(25w) |
| 3953.487 | 18.1 | 0.055 | 0.31 | 3953.482 | Fe I(770)3953.512(2),Nd II(-) 3953.525(60) |
| 3953.874 | 16.8 | 0.085 | 0.19 | 3953.869 | Fe I(362)3953.8576((1)) |
| 3954.550 | 10.2 | 0.049 | 0.19 | 3954.545 | |
| 3954.777 | 2.7 | 0.022 | 0.12 | 3954.772 | Fe I(606*)3954.7127((1)) |
| 3955.149 | 2.0 | 0.023 | 0.08 | 3955.144 | |
| 3955.345 | 63.3 | 0.272 | 0.22 | 3955.340 | Fe I(562)3955.3413((3)) |
| 3955.974 | 35.1 | 0.188 | 0.18 | 3955.969 | Fe I(488)3955.9555(2) |
| 3956.431 | 120.6 | 0.409 | 0.28 | 3956.426 | Fe I(604)3956.4554(9) |
| 3956.699 | 76.2 | 0.373 | 0.19 | 3956.694 | Fe I(278)3956.6768(12) |
| 3957.032 | 76.0 | 0.342 | 0.21 | 3957.027 | Fe I(562)3957.0184(4n),Ca I(6) 3957.053(10) |
| 3957.673 | 10.5 | 0.052 | 0.19 | 3957.668 | Gd II(19)3957.67(1200) |
| 3957.975 | 7.4 | 0.043 | 0.16 | 3957.970 | Co I(18)3957.928(15),Cr I(307) 3958.084(30) |
| 3958.225 | 61.5 | 0.298 | 0.19 | 3958.220 | Zr II(16)3958.24(50),Ti I(13) 3958.206(80) |
| 3958.782 | 5.1 | 0.025 | 0.19 | 3958.777 | |
| 3959.757 | 2.7 | 0.031 | 0.08 | 3959.752 | |
| 3960.292 | 25.3 | 0.127 | 0.19 | 3960.287 | Fe I(913)3960.2792((1)) |
| 3960.887 | 3.6 | 0.030 | 0.11 | 3960.882 | Fe II(212)3960.895(3),Ce II(84) 3960.91(770) |
| 3961.157 | 30.3 | 0.147 | 0.19 | 3961.152 | Fe I(361)3961.1402((2)) |
| 3961.532 | 139.5 | 0.521 | 0.25 | 3961.527 | Al I(1)3961.523(10R) |
| 3962.034 | 5.5 | 0.049 | 0.11 | 3962.029 | |
| 3962.165 | 10.1 | 0.052 | 0.18 | 3962.160 | Ni I(199)3962.12(3n) |
| 3962.361 | 14.4 | 0.080 | 0.17 | 3962.356 | Fe I(566)3962.3520((2)) |
| 3962.873 | 7.0 | 0.052 | 0.13 | 3962.868 | Ti I(12)3962.851(35) |
| 3963.124 | 47.2 | 0.240 | 0.18 | 3963.119 | Fe I(562)3963.1005(6n),Nd II(39) 3963.12(1400) |
| 3963.694 | 35.1 | 0.197 | 0.17 | 3963.689 | Cr I(38)3963.694(200R) |
| 3964.290 | 17.0 | 0.070 | 0.23 | 3964.285 | Ti I(12)3964.269(35) |
| 3964.552 | 30.7 | 0.166 | 0.17 | 3964.547 | Fe I(361)3964.5153(3) |
| 3964.884 | 3.0 | 0.027 | 0.10 | 3964.879 | Pr II(8)3964.825(250) |
| 3965.166 | 2.5 | 0.028 | 0.09 | 3965.161 | |
| 3965.499 | 10.1 | 0.072 | 0.13 | 3965.494 | Fe I(565)3965.5088((1)) |
| 3966.054 | 52.4 | 0.244 | 0.20 | 3966.049 | Fe I(45)3966.0617(10) |
| 3966.592 | 51.3 | 0.208 | 0.23 | 3966.587 | Fe I(652)3866.4995(1n),Fe I (282,562)3866.630(10n) |
| 3966.900 | 3.8 | 0.039 | 0.09 | 3966.895 | Fe I(659)3966.8100((1)) |
| 3967.210 | 10.1 | 0.070 | 0.14 | 3967.205 | |
| 3967.465 | 20.4 | 0.114 | 0.17 | 3967.460 | Fe I(604)3967.4206(8) |
| 3967.758 | 12.1 | 0.065 | 0.17 | 3967.753 | Y II(82)3967.670(107) |
| 3968.505 | | | | 3968.500 | Ca II(1)3968.470(350R) |
| 3969.265 | 57.0 | 0.241 | 0.22 | 3969.260 | Fe I(43)3969.2572(30) |
| 3970.162 | | | | 3970.157 | H-epsilon 3970.074 |

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| | | | | | 3938.289(2) |
| 3938.939 | 4.3 | 0.029 | 0.14 | 3938.931 | Fe II(190)3938.969(4) |
| 3940.035 | 8.5 | 0.045 | 0.18 | 3940.027 | Fe I(731)3940.044((1)) |
| 3940.333 | 7.1 | 0.037 | 0.18 | 3940.325 | (Ti II(97)3940.320(p)),Ce II(MCS) 3940.34(770) |
| 3940.886 | 54.8 | 0.288 | 0.18 | 3940.878 | Fe I(20)3940.8776(5),Co I(18) 3940.887(12) |
| 3941.275 | 48.9 | 0.230 | 0.20 | 3941.267 | Fe I((562)3941.2753((3)) |
| 3941.500 | 16.3 | 0.111 | 0.14 | 3941.492 | Cr I(23)3941.499(90r),Nd II(MCS) 3941.51(2000) |
| 3941.752 | 6.8 | 0.024 | 0.27 | 3941.744 | Co I(17)3941.728(20) |
| 3942.433 | 64.9 | 0.302 | 0.20 | 3942.425 | Fe I(364)3942.4399(6) |
| 3943.141 | 9.3 | 0.059 | 0.15 | 3943.133 | (Cr I(135)3943.201(15)) |
| 3943.335 | 12.4 | 0.084 | 0.14 | 3943.327 | Fe I(72)3943.3407(2) |
| 3943.465 | 34.0 | 0.084 | 0.38 | 3943.457 | |
| 3944.021 | 156.1 | 0.535 | 0.27 | 3944.013 | Al I(1)3944.009(10R),(Ni I(151) 3944.126(12n)) |
| 3944.697 | 24.6 | 0.137 | 0.17 | 3944.689 | Fe I(361)3944.7387((2)) |
| 3944.884 | 41.4 | 0.202 | 0.19 | 3944.876 | Fe I(430)3944.8893(3) |
| 3945.170 | 91.1 | 0.317 | 0.27 | 3945.162 | Fe I(280)3945.1172(4),Fe II(3) 3945.21(p) |
| 3945.453 | 1.6 | 0.025 | 0.06 | 3945.445 | Cr I(135)3945.50(40) |
| 3945.889 | 11.9 | 0.052 | 0.21 | 3945.881 | Cr I(134)3945.967(45) |
| 3946.613 | 3.2 | 0.019 | 0.16 | 3946.605 | |
| 3947.009 | 51.8 | 0.248 | 0.20 | 3947.001 | Fe I(561)3946.9949(4n) |
| 3947.547 | 77.3 | 0.262 | 0.28 | 3947.539 | Fe I(361)3947.5309(5) |
| 3947.785 | 12.9 | 0.075 | 0.16 | 3947.777 | Ti I(14)3947.770(40) |
| 3948.107 | 63.0 | 0.294 | 0.20 | 3948.099 | Fe I(562)3948.0973(6n) |

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| 3935.869 | 52.3 | 0.201 | 0.24 | 3935.864 | Fe I(362)3935.8124(8),Fe II(173) 3935.942(5),Co I(32)3935.964(30) |
| 3937.331 | 34.4 | 0.195 | 0.17 | 3937.326 | Fe I(278)3937.379(3) |
| 3938.006 | 12.8 | 0.067 | 0.18 | 3938.001 | Ce II(MCS)3938.09(560) |
| 3938.376 | 119.6 | 0.396 | 0.28 | 3938.371 | Cr I(K)3939.352(25W),Mg I(18) 3938.400((0)),Fe II(3)3938.289(2) |
| 3938.936 | 8.7 | 0.035 | 0.24 | 3938.931 | Fe II(190)3938.969(4) |
| 3940.086 | 3.9 | 0.027 | 0.14 | 3940.081 | Fe I(731)3940.044((1)) |
| 3940.884 | 63.8 | 0.302 | 0.20 | 3940.879 | Fe I(20)3940.8776(5),Co I(18) 3940.887(12) |
| 3941.282 | 51.3 | 0.247 | 0.20 | 3941.277 | Fe I(562)3941.2753((3)) |
| 3941.504 | 21.7 | 0.120 | 0.17 | 3941.499 | Cr I(23)3941.499(90r),Nd II(MCS) 3941.51(2000) |
| 3941.803 | 8.0 | 0.036 | 0.21 | 3941.798 | Co I(17)3941.728(20) |
| 3942.186 | 9.6 | 0.060 | 0.15 | 3942.181 | Ce II(37)3942.15(2000) |
| 3942.434 | 66.4 | 0.330 | 0.19 | 3942.429 | Fe I(364)3942.4399(6) |
| 3942.757 | 9.6 | 0.059 | 0.15 | 3942.752 | Ce II(57)3942.75(2700) |
| 3943.099 | 10.6 | 0.076 | 0.13 | 3943.094 | (Cr I(135)3943.221(15)) |
| 3943.345 | 36.3 | 0.164 | 0.21 | 3943.340 | Fe I(72)3943.3407(2) |
| 3943.583 | 13.7 | 0.073 | 0.18 | 3943.578 | Cr I(K)3943.618(20) |
| 3944.017 | 162.9 | 0.554 | 0.28 | 3944.012 | Al I(1)3944.009(10R) |
| 3944.733 | 29.1 | 0.144 | 0.19 | 3944.728 | Fe I(361)3944.7387((2)) |
| 3944.901 | 35.0 | 0.177 | 0.19 | 3944.896 | Fe I(430)3944.8893(3) |
| 3945.166 | 85.7 | 0.308 | 0.26 | 3945.161 | Fe I(280)3945.1172(4),Fe II(3) 3945.21(p) |
| 3945.889 | 9.3 | 0.054 | 0.16 | 3945.884 | Cr I(134)3945.967(45) |
| 3947.014 | 51.2 | 0.257 | 0.19 | 3947.009 | Fe I(561)3946.9949(4n) |
| 3947.547 | 80.4 | 0.270 | 0.28 | 3947.542 | Fe I(361)3947.5309(5) |
| 3947.768 | 16.1 | 0.088 | 0.17 | 3947.763 | Ti I(14)3947.770(40) |
| 3948.113 | 73.5 | 0.317 | 0.22 | 3948.108 | Fe I(562)3948.0973(6n) |
| 3948.770 | 116.2 | 0.437 | 0.25 | 3948.765 | Fe I(604)3948.7749(10),Cr I(K) |

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| 3912.950 | 3.7 | 0.024 | 0.14 | 3912.942 | Ni I(15)3912.979(5) |
| 3913.327 | 22.2 | 0.097 | 0.21 | 3913.319 | |
| 3913.458 | 73.8 | 0.428 | 0.16 | 3913.450 | Ti II(34)3913.477(12) |
| 3913.607 | 85.5 | 0.379 | 0.21 | 3913.599 | Fe I(120)3913.6318(4) |
| 3914.303 | 83.4 | 0.308 | 0.25 | 3914.295 | Fe I(567)3914.2730((1)),V II(33) 3914.333(250),Cr I(K)3914.35(40) |
| 3914.523 | 34.5 | 0.187 | 0.17 | 3914.515 | Fe II(3)3914.480(2) |
| 3915.207 | 11.6 | 0.063 | 0.17 | 3915.199 | |
| 3915.530 | 13.2 | 0.057 | 0.22 | 3915.522 | Cr I(K)3915.514(25) |
| 3915.920 | 53.6 | 0.161 | 0.31 | 3915.912 | Zr II(17)3915.94(25),Cr I(136) 3915.854(100),La II(MCS)3916.05 (1300) |
| 3916.399 | 65.6 | 0.261 | 0.24 | 3916.391 | V II(10)3916.418(200) |
| 3916.743 | 61.1 | 0.308 | 0.19 | 3916.735 | Fe I(606*)3916.7310(6) |
| 3917.188 | 80.4 | 0.373 | 0.20 | 3917.180 | Fe I(20)3917.181(8) |
| 3917.613 | 2.3 | 0.024 | 0.09 | 3917.605 | Cr I(137)3917.608(75) |
| 3918.371 | 111.5 | 0.449 | 0.23 | 3918.363 | Mn I(C)3918.319(60c),Fe I(124) 3918.3153(3),Ce II(12,248) 3918.28(770),Fe I(364) 3918.4154(4) |
| 3918.645 | 71.1 | 0.334 | 0.20 | 3918.637 | Fe I(430)3918.6417(6) |
| 3919.118 | 96.9 | 0.399 | 0.23 | 3919.110 | Fe I(430)3919.0655(3),Cr I(23) 3919.165(200R) |
| 3920.267 | 113.7 | 0.520 | 0.21 | 3920.259 | Fe I(4)3920.2581(20r) |
| 3920.668 | 32.7 | 0.087 | 0.35 | 3920.660 | Fe I(153)3920.645((1)) |
| 3920.814 | 7.6 | 0.072 | 0.10 | 3920.806 | Fe I(567)3920.8370((1)) |
| 3921.047 | 82.1 | 0.239 | 0.32 | 3921.039 | Cr I(23)3921.031(100r),Nd II(MCS) 3920.96(1100) |
| 3921.542 | 24.2 | 0.075 | 0.30 | 3921.534 | La II(40)3921.54(1100) |
| 3921.734 | 3.7 | 0.032 | 0.11 | 3921.726 | Ce II(195)3921.73(590),Mn I(C) 3921.766(30Hw) |
| 3922.497 | 7.6 | 0.028 | 0.26 | 3922.489 | (V I(42)3922.431(12)),Sm II(38) 3922.40(2500) |
| 3922.680 | 5.0 | 0.052 | 0.09 | 3922.672 | Mn I(C)3922.681(40Hw) |
| 3922.929 | 138.1 | 0.548 | 0.24 | 3922.921 | Fe I(4)3922.9118(25R) |
| 3924.115 | 3.5 | 0.030 | 0.11 | 3924.107 | Mn I(-)3924.075(40H) |
| 3924.539 | 18.8 | 0.105 | 0.17 | 3924.531 | Ti I(13)3924.527(50) |
| 3925.206 | 27.1 | 0.149 | 0.17 | 3925.198 | Fe I(567)3925.2005((1)) |
| 3925.641 | 61.3 | 0.284 | 0.20 | 3925.633 | Fe I(364)3925.6438(4) |
| 3925.980 | 94.5 | 0.413 | 0.22 | 3925.972 | Fe I(364)3925.9413(4),Fe I(562) 3926.0132((1)) |
| 3926.456 | 13.4 | 0.057 | 0.22 | 3926.448 | Mn I(44)3926.467(100Hw) |
| 3927.448 | 2.1 | 0.015 | 0.13 | 3927.440 | |
| 3927.932 | 112.0 | 0.487 | 0.22 | 3927.924 | Fe I(4,361)3927.9199(30R) |
| 3928.103 | 65.3 | 0.247 | 0.25 | 3928.095 | Fe I(565)3928.0829((1)) |
| 3928.647 | 13.7 | 0.098 | 0.13 | 3928.639 | Cr I(23)3928.647(100r) |
| 3929.197 | 58.2 | 0.223 | 0.24 | 3929.189 | (Ti II(97)3929.15(p)),La II(27) 3929.22(2000),Fe I(659)3929.2083 ((1)),Mn I(C)3929.248(30Hw) |
| 3929.695 | 3.4 | 0.039 | 0.08 | 3929.687 | Cr I(K)3929.66(20wh),V II(10) 3929.734(50) |
| 3929.852 | 6.8 | 0.041 | 0.16 | 3929.844 | Ti I(13)3929.875(40) |
| 3930.313 | 100.3 | 0.444 | 0.21 | 3930.305 | Fe I(4)3930.2967(25R) |
| 3931.120 | 14.8 | 0.098 | 0.14 | 3931.112 | Fe I(565)3931.1172((3)),Ce II(49) 3931.09(770) |
| 3932.031 | 28.5 | 0.117 | 0.23 | 3932.023 | Ti II(34)3932.020(11) |
| 3933.758 | | | | 3933.750 | Ca II(1)3933.664(400R) |
| 3935.849 | 52.9 | 0.168 | 0.30 | 3935.841 | Fe I(362)3935.8124(8),Fe II(173) 3935.942(5),Co I(32)3935.964(30) |
| 3937.334 | 31.4 | 0.180 | 0.16 | 3937.326 | Fe I(278)3937.3279(3) |
| 3938.011 | 10.6 | 0.067 | 0.15 | 3938.003 | Ce II(MCS)3939.09(560) |
| 3938.370 | 106.4 | 0.378 | 0.26 | 3938.362 | Cr I(K)3938.352(25w),Mg I(18) 3938.400((0)),Fe II(3) |

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| | | | | | (60),Fe I(175)3893.9125((2)) |
| 3894.574 | 6.2 | 0.027 | 0.22 | 3894.566 | Fe I(566)3894.49((1)),Nd II(MCS) 3894.63(810) |
| 3894.986 | 12.3 | 0.080 | 0.14 | 3894.978 | Co I(18)3894.976(20) |
| 3895.189 | 20.3 | 0.067 | 0.29 | 3895.181 | Ce II(210)3895.11(620),Ti I(176) 3895.243(30r) |
| 3895.456 | 23.6 | 0.106 | 0.21 | 3895.448 | Fe I(565)3895.44((1)) |
| 3895.658 | 119.7 | 0.520 | 0.22 | 3895.650 | Fe I(4)3895.6564(25r),Mg I(47) 3895.662(10) |
| 3896.136 | 18.6 | 0.118 | 0.15 | 3896.128 | (Fe II(23)3896.11(p)) |
| 3896.271 | 5.6 | 0.048 | 0.11 | 3896.263 | V II(10)3896.155(60) |
| 3896.462 | 8.5 | 0.042 | 0.19 | 3896.454 | |
| 3896.821 | 2.0 | 0.015 | 0.13 | 3896.813 | Ce II(188)3896.80(590) |
| 3897.457 | 41.9 | 0.199 | 0.20 | 3897.449 | Fe I(429)3897.4487((2)) |
| 3897.966 | 149.3 | 0.509 | 0.28 | 3897.958 | Fe I(280)3897.8899(8),Fe I(20) 3898.0089(10) |
| 3898.450 | 19.7 | 0.066 | 0.28 | 3898.442 | (Co I(58)3898.485(4)) |
| 3899.092 | 75.4 | 0.288 | 0.25 | 3899.084 | Fe I(175)3899.0289(2),V II(33) 3899.140(200) |
| 3899.719 | 127.1 | 0.534 | 0.22 | 3899.711 | Mn I(C)3899.620(30),Fe I(4) 3899.7074(300R) |
| 3900.249 | 15.0 | 0.046 | 0.31 | 3900.241 | Nd II(-)3900.21(2000) |
| 3900.545 | 120.3 | 0.529 | 0.21 | 3900.537 | Ti II(34)3900.559(12),Fe I(565) 3900.5150(2) |
| 3900.803 | 33.2 | 0.096 | 0.33 | 3900.795 | |
| 3901.594 | 3.0 | 0.022 | 0.12 | 3901.586 | |
| 3901.875 | 9.9 | 0.051 | 0.18 | 3901.867 | Nd II(-)3901.84(1300) |
| 3902.268 | 8.2 | 0.025 | 0.31 | 3902.260 | V I(7)3902.250(50r) |
| 3902.674 | 10.7 | 0.052 | 0.19 | 3902.666 | |
| 3902.953 | 131.5 | 0.538 | 0.23 | 3902.945 | Cr I(23)3902.911(125),Fe I(45) 3902.9457(20) |
| 3903.256 | 42.7 | 0.206 | 0.19 | 3903.248 | Cr I(23)3903.171(50),V II(11) 3903.27(250) |
| 3903.891 | 101.9 | 0.398 | 0.24 | 3903.883 | Fe I(429)3903.8979(5) |
| 3904.814 | 38.3 | 0.148 | 0.24 | 3904.806 | Ti I(56)3904.785(40n),Co I(171) 3904.790(10) |
| 3905.208 | 14.7 | 0.053 | 0.26 | 3905.200 | (Fe I(564)3905.18(p)) |
| 3905.537 | 177.3 | 0.605 | 0.28 | 3905.529 | Si I(3)3095.523(300),Cr II(167) 3905.64(25) |
| 3905.953 | 39.5 | 0.088 | 0.42 | 3905.945 | Nd II(-)3905.89(1700),Fe II(173) 3906.037(5) |
| 3906.485 | 107.8 | 0.450 | 0.22 | 3906.477 | Fe I(4)3906.4798(8) |
| 3906.760 | 34.8 | 0.206 | 0.16 | 3906.752 | Fe I(664)3906.7471(2) |
| 3907.096 | 8.1 | 0.028 | 0.27 | 3907.088 | Eu II(5)3907.10(28000) |
| 3907.480 | 20.0 | 0.109 | 0.17 | 3907.472 | (Fe I(284)3907.4653((1)) |
| 3907.939 | 52.7 | 0.275 | 0.18 | 3907.931 | Fe I(280)3907.9341(4) |
| 3908.431 | 11.2 | 0.051 | 0.21 | 3908.423 | Ce II(65)3908.41(560),Pr II(11) 3908.431(200) |
| 3908.779 | 49.8 | 0.184 | 0.25 | 3908.771 | Cr I(23)3908.762(150r) |
| 3908.995 | 5.1 | 0.041 | 0.12 | 3908.987 | Ni I(117)3908.931(8n) |
| 3909.653 | 32.1 | 0.179 | 0.17 | 3909.645 | Fe I(565)3909.6576((1)) |
| 3909.844 | 68.8 | 0.279 | 0.23 | 3909.836 | Fe I(364)3909.8296(3) |
| 3910.341 | 2.6 | 0.017 | 0.14 | 3910.333 | |
| 3910.506 | 10.1 | 0.054 | 0.18 | 3910.498 | |
| 3910.851 | 42.2 | 0.204 | 0.20 | 3910.843 | Fe I(284)3910.8437((3)) |
| 3911.012 | 20.7 | 0.111 | 0.18 | 3911.004 | Fe I(562)3910.9991((1)) |
| 3911.200 | 9.7 | 0.046 | 0.20 | 3911.192 | (Ti I(175)3911.185(8n)),Nd II(MCS) 3911.16(2000) |
| 3911.832 | 19.2 | 0.065 | 0.28 | 3911.824 | Cr I(K)3911.83(50wh) |
| 3912.008 | 12.0 | 0.062 | 0.18 | 3912.000 | |
| 3912.309 | 25.8 | 0.090 | 0.27 | 3912.301 | Ni I(151)3912.310(8n),Ce II(MCS) 3912.44(980),Nd II(MCS)3912.23 (850) |

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| | | | | | 3880.38(780) |
| 3880.789 | 6.0 | 0.028 | 0.20 | 3880.779 | Nd II(MCS)3880.78(1200) |
| 3881.244 | 3.2 | 0.016 | 0.19 | 3881.234 | Cr I(138)3881.22(50w) |
| 3881.921 | 52.5 | 0.219 | 0.22 | 3881.911 | Co I(18)3881.869(25),Cr I(138) 3881.862(25),Ni II(13)3881.92(1) |
| 3882.298 | 62.2 | 0.269 | 0.22 | 3882.288 | Ti I(176)3882.313(10n) |
| 3882.532 | 10.1 | 0.049 | 0.19 | 3882.522 | Ce II(MCS)3883.45(1500) |
| 3882.935 | 23.4 | 0.090 | 0.24 | 3882.925 | Ti I(176)3882.892(20n) |
| 3883.289 | 63.0 | 0.280 | 0.21 | 3883.279 | Cr I(23)3883.292(200W),Fe I(663) 3883.2800((4)) |
| 3883.704 | 1.9 | 0.018 | 0.10 | 3883.694 | Cr I(138)3883.664(100W) |
| 3884.353 | 62.9 | 0.294 | 0.20 | 3884.343 | Fe I(282)3884.3587(3) |
| 3884.849 | 2.2 | 0.025 | 0.08 | 3884.839 | V II(33)3884.847(50) |
| 3885.199 | 27.2 | 0.150 | 0.17 | 3885.189 | Fe I(430)3885.1456((1)),Cr I(K) 3885.20(75),Cr I(23)3885.24 (100),Sm II(MCS)3885.29(3700) |
| 3885.530 | 44.8 | 0.239 | 0.18 | 3885.520 | Fe I(124)3885.5106(5) |
| 3886.302 | 125.8 | 0.553 | 0.21 | 3886.292 | Fe I(4)3886.2823(40R),La II(MCS) 3886.37(1700) |
| 3886.807 | 5.7 | 0.046 | 0.12 | 3886.797 | Cr I(23)3886.80(50) |
| 3887.062 | 88.5 | 0.411 | 0.20 | 3887.052 | Fe I(20)3887.0482 (15),Cr I(K) 3887.081(15bl) |
| 3888.516 | 51.9 | 0.293 | 0.17 | 3888.506 | Fe I(565)3888.4162((1)),Fe I(45) 3888.5135(20) |
| 3889.090 | | | | 3889.080 | H8 3889.051 |
| 3890.877 | 30.0 | 0.154 | 0.18 | 3890.867 | Fe I(280)3890.8405(2),Cr I(262) 3890.826(20),Nd II(MCS)3890.94 (1300) |
| 3891.929 | 53.0 | 0.217 | 0.23 | 3891.919 | Fe I(731)3891.9264(3),Cr I(K) 3891.932 (100w) |

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| 3882.946 | 18.8 | 0.071 | 0.25 | 3882.938 | Ti I(176)3882.892(20n) |
| 3883.299 | 60.8 | 0.282 | 0.20 | 3883.291 | Cr I(23)3883.292(200W),Fe I(663) 3883.2800((4)) |
| 3883.621 | 4.2 | 0.017 | 0.24 | 3883.613 | Cr I(138)3883.664(100W) |
| 3884.354 | 58.4 | 0.278 | 0.20 | 3884.346 | Fe I(282)3884.3587(3) |
| 3885.194 | 26.3 | 0.151 | 0.16 | 3885.186 | Fe I(430)3885.1456((1)),Cr I(K) 3885.20(75),Cr I(23)3885.24 (100),Sm II(MCS)3885.29(3700) |
| 3885.525 | 45.1 | 0.236 | 0.18 | 3885.517 | Fe I(124)3885.5106(5) |
| 3886.299 | 134.9 | 0.540 | 0.23 | 3886.291 | Fe I(4)3886.2823(40R) |
| 3886.814 | 10.5 | 0.070 | 0.14 | 3886.806 | Cr I(23)3886.80(50) |
| 3887.068 | 88.1 | 0.398 | 0.21 | 3887.060 | Fe I(20)3887.0482(15),Cr I(K) 3887.081(15bl) |
| 3888.512 | 54.1 | 0.286 | 0.18 | 3888.504 | Fe I(565)3888.4162((1)),Fe I(45) 3888.5135(20) |
| 3889.077 | | | | 3889.069 | H8 3889.051 |
| 3890.406 | 4.8 | 0.028 | 0.16 | 3890.398 | Fe I(567)3890.3958((1)) |
| 3890.871 | 27.5 | 0.149 | 0.17 | 3890.863 | Fe I(280)3890.8405(2),Cr I(262) 3890.826(20),Nd II(MCS)3890.94 (1300) |
| 3891.524 | 3.8 | 0.038 | 0.09 | 3891.516 | |
| 3891.919 | 57.1 | 0.222 | 0.24 | 3891.911 | Fe I(731)3891.9264(3),Cr I(K) 3891.932 (100w) |
| 3892.966 | 26.7 | 0.120 | 0.21 | 3892.958 | Fe I(283)3892.8923((1)),Fe I(567) 3892.9822((1)) |
| 3893.371 | 92.3 | 0.382 | 0.23 | 3893.363 | Mg I(47)3893.375(3),Fe I(430) 3893.3903(7),Fe I(364)3893.3094 ((1)) |
| 3894.032 | 120.1 | 0.432 | 0.26 | 3894.024 | Fe I(663)3894.0120((2)),Cr I(23) 3894.039(100),Co I(34)3894.073 |

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| 3864.319 | 8.3 | 0.029 | 0.27 | 3864.309 | |
| 3864.905 | 11.6 | 0.055 | 0.20 | 3864.895 | V I(7)3864.862(35) |
| 3865.535 | 143.1 | 0.580 | 0.23 | 3865.525 | Fe I(20)3865.5231(30),Cr II(167) 3865.60(25) |
| 3865.928 | 14.7 | 0.048 | 0.29 | 3865.918 | Cr II(130)3866.01(5),Cr I(K)3865.96 (20wh) |
| 3866.483 | 9.7 | 0.049 | 0.18 | 3866.473 | Ti I(176)3866.446(15n),Cr II(130) 3866.54(7) |
| 3866.776 | 30.8 | 0.110 | 0.26 | 3866.766 | V II(11)3866.744(60) |
| 3867.005 | 3.4 | 0.031 | 0.10 | 3866.995 | |
| 3867.225 | 71.6 | 0.364 | 0.18 | 3867.215 | Fe II(488)3867.219(7) |
| 3867.421 | 6.2 | 0.030 | 0.19 | 3867.411 | |
| 3867.721 | 7.4 | 0.025 | 0.28 | 3867.711 | |
| 3867.933 | 30.4 | 0.164 | 0.17 | 3867.923 | Fe I(221)3867.9205(1) |
| 3868.257 | 25.2 | 0.076 | 0.31 | 3868.247 | Fe I(430)3868.2323((1)),Cr I(K) 3868.27(25) |
| 3868.663 | 4.1 | 0.020 | 0.20 | 3868.653 | |
| 3869.284 | 2.5 | 0.017 | 0.14 | 3869.274 | Ti I(175)3869.275(5n) |
| 3869.591 | 71.9 | 0.337 | 0.20 | 3869.581 | Fe I(284,284)3869.5583,.6080(3n) |
| 3870.169 | 11.9 | 0.073 | 0.15 | 3870.159 | (Cr I(11)3870.24(50WH)) |
| 3870.512 | 8.6 | 0.043 | 0.19 | 3870.502 | Ca I(26)3870.508((2)) |
| 3870.829 | 12.3 | 0.064 | 0.18 | 3870.819 | |
| 3871.279 | 4.8 | 0.028 | 0.16 | 3871.269 | |
| 3871.619 | 15.3 | 0.087 | 0.16 | 3871.609 | Ni I(181)3871.60((3)),Cr I (K) 3871.53(10h),La II(MCS) 3871.64 (3400) |
| 3871.754 | 68.7 | 0.334 | 0.19 | 3871.744 | Fe I(429)3871.7480(4),Sm II(18) 3871.778(300) |
| 3872.131 | 20.8 | 0.080 | 0.24 | 3872.121 | Y II(N)3872.110(43) |
| 3872.506 | 113.3 | 0.531 | 0.20 | 3872.496 | Fe I(20)3872.5012(60),Ca I(26) 3872.552((3)) |
| 3872.767 | 63.3 | 0.186 | 0.32 | 3872.757 | Fe II(29)3872.76(p) |
| 3872.985 | 26.7 | 0.109 | 0.23 | 3872.975 | Fe I(284)3872.9212(1) |
| 3873.134 | 63.6 | 0.319 | 0.19 | 3873.124 | Co I(18)3873.120(80) |
| 3873.291 | 1.6 | 0.013 | 0.12 | 3873.281 | Ti I(176)3873.203(10n) |
| 3873.590 | 4.2 | 0.034 | 0.12 | 3873.580 | |
| 3873.772 | 78.4 | 0.375 | 0.20 | 3873.762 | Fe I(175)3873.7606(8) |
| 3873.967 | 45.3 | 0.293 | 0.15 | 3873.957 | Co I(18)3873.963(40) |
| 3874.117 | 10.7 | 0.085 | 0.12 | 3874.107 | Fe I(120)3874.0535((1)) |
| 3874.518 | 13.0 | 0.074 | 0.16 | 3874.508 | Cr I(138)3874.55(75w) |
| 3874.755 | 6.5 | 0.026 | 0.23 | 3874.745 | Co I(18)3874.726(10) |
| 3875.055 | 7.4 | 0.050 | 0.14 | 3875.045 | V I(7)3875.075(35),Cr I(138)3875.14 (15w) |
| 3875.250 | 13.6 | 0.054 | 0.24 | 3875.240 | Ti I(175)3875.262(20n),Cr I(K) 3875.23(50w) |
| 3875.701 | 13.9 | 0.069 | 0.19 | 3875.691 | |
| 3875.818 | 19.2 | 0.122 | 0.15 | 3875.808 | Ca I(26)3875.807((4)) |
| 3876.044 | 56.6 | 0.256 | 0.21 | 3876.034 | Fe I(22)3876.0400(4) |
| 3876.686 | 5.6 | 0.031 | 0.17 | 3876.676 | Fe I(121)3876.6703((1)) |
| 3876.888 | 18.6 | 0.072 | 0.24 | 3876.878 | Co I(17,62)3876.831(20) |
| 3877.248 | 6.9 | 0.034 | 0.19 | 3877.238 | |
| 3878.034 | 140.5 | 0.560 | 0.24 | 3878.024 | Fe I(20)3878.0182(60) |
| 3878.295 | 64.7 | 0.292 | 0.21 | 3878.285 | Y II(7)3878.285(272),Ce II(48) 3878.36(1100),Cr I(K)3878.30 (10ws) |
| 3878.630 | 226.4 | 0.701 | 0.30 | 3878.620 | Fe I(4)3878.5733(100r),Fe I(175) 3878.6709((8)),Nd II(MCS)3878.58 (1100) |
| 3879.179 | 10.2 | 0.047 | 0.20 | 3879.169 | Cr I(138)3879.231(50W) |
| 3879.571 | 3.8 | 0.025 | 0.14 | 3879.561 | Nd II(MCS)3879.55(1000) |
| 3879.877 | 1.7 | 0.011 | 0.15 | 3879.867 | |
| 3880.285 | 5.1 | 0.044 | 0.11 | 3880.275 | |
| 3880.415 | 3.8 | 0.035 | 0.10 | 3880.405 | Cr I(K)3880.35(10w),Nd II(MCS) |

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| 3846.411 | 67.4 | 0.287 | 0.22 | 3846.401 | Fe I(804)3846.4094 (2),Y II(N) 3846.372(25) |
| 3846.819 | 99.7 | 0.398 | 0.24 | 3846.809 | Fe I(664,702)3846.7998(8) |
| 3847.352 | 13.9 | 0.060 | 0.22 | 3847.342 | V II(156)3847.323(100) |
| 3847.928 | 3.4 | 0.018 | 0.17 | 3847.918 | |
| 3848.100 | 1.9 | 0.021 | 0.08 | 3848.090 | Y II(72)3848.050(53) |
| 3848.284 | 28.4 | 0.138 | 0.19 | 3848.274 | Mg II(5)3848.24(7),Nd II(MCS) 3848.31(1700) |
| 3848.564 | 13.0 | 0.053 | 0.23 | 3848.554 | Ce II(36)3848.59(860),Nd II(MCS) 3842.52(1500) |
| 3849.006 | 23.6 | 0.117 | 0.19 | 3848.996 | Cr I(69)3848.983(150W),La II(MCS) 3849.02(1600) |
| 3849.351 | 11.4 | 0.070 | 0.15 | 3849.341 | Cr I(138)3849.35(175W) |
| 3849.545 | 42.5 | 0.172 | 0.23 | 3849.535 | Cr I(24)3849.541(100W),Ni II(11) 3849.58(2) |
| 3849.978 | 134.6 | 0.568 | 0.22 | 3849.968 | Fe I(20)3849.9666(40),Cr I(69) 3850.029(200W) |
| 3850.175 | 5.7 | 0.037 | 0.14 | 3850.165 | |
| 3850.382 | 12.5 | 0.040 | 0.29 | 3850.372 | Mg II(5)3850.40(6) |
| 3850.833 | 105.3 | 0.444 | 0.22 | 3850.823 | Fe I(22)3850.8179(12) |
| 3851.580 | 5.1 | 0.037 | 0.13 | 3851.570 | Fe I(-)3851.58((4)) |
| 3851.750 | 9.1 | 0.049 | 0.18 | 3851.740 | Nd II(35)3851.66,.74(2400) |
| 3852.220 | 11.5 | 0.053 | 0.21 | 3852.210 | Cr I(24)3852.221(60) |
| 3852.578 | 81.0 | 0.366 | 0.21 | 3852.568 | Fe I(73)3852.5727(6),Cr I(11) 3852.56(15) |
| 3853.127 | 14.0 | 0.043 | 0.30 | 3853.117 | Cr I(69)3853.188(50),Ce II(39) 3853.15(860) |
| 3853.438 | 26.8 | 0.109 | 0.23 | 3853.428 | Fe I(429)3853.4567((1)) |
| 3853.676 | 34.6 | 0.158 | 0.21 | 3853.666 | Si II(1)3853.664(100h) |
| 3854.208 | 14.6 | 0.082 | 0.17 | 3854.198 | Cr I(69)3854.229(100),Ce II(62 3854.18(1200),Sm II(MCS) 3854.21(2700) |
| 3854.359 | 55.4 | 0.258 | 0.20 | 3854.349 | Ce II(69)3854.31(1200),Fe I(567) 3854.375(1) |
| 3855.331 | 24.2 | 0.124 | 0.18 | 3855.321 | Fe I(283)3855.3138((1w)),Cr I(69) 3855.296(50),Ce II(MCS)3855.29 (620) |
| 3855.512 | 26.5 | 0.077 | 0.32 | 3855.502 | Cr I(69)3855.58(100) |
| 3855.838 | 28.2 | 0.178 | 0.15 | 3855.828 | V I(9)3855.841(60r),Fe I(567) 3855.8454((1w)) |
| 3856.011 | 90.5 | 0.388 | 0.22 | 3856.001 | Si II(1)3856.017(500h) |
| 3856.383 | 149.3 | 0.605 | 0.23 | 3856.373 | Fe I(4)3856.3716(50r),Cr I(69) 3856.283(60) |
| 3857.649 | 14.5 | 0.082 | 0.17 | 3857.639 | Cr I(69)3857.63(100w) |
| 3858.309 | 107.7 | 0.466 | 0.22 | 3858.299 | Ni I(32)3858.301(40r) |
| 3858.874 | 62.7 | 0.230 | 0.26 | 3858.864 | Cr I(138)3858.89(50w) |
| 3859.228 | 89.2 | 0.394 | 0.21 | 3859.218 | Fe I(175)3859.2125(10) |
| 3859.919 | 218.2 | 0.674 | 0.30 | 3859.909 | Fe I(4)3859.911(300R) |
| 3860.337 | 8.1 | 0.028 | 0.27 | 3860.327 | |
| 3861.030 | 10.3 | 0.041 | 0.24 | 3861.020 | |
| 3861.222 | 26.1 | 0.133 | 0.18 | 3861.212 | Co I(33)3861.164(20) |
| 3861.359 | 39.0 | 0.233 | 0.16 | 3861.349 | Fe I(283)3861.3401(2) |
| 3861.587 | 9.0 | 0.058 | 0.14 | 3861.577 | Fe I(663)3861.60((1)) |
| 3861.986 | 4.3 | 0.022 | 0.18 | 3861.976 | (Sm II(10)3862.054(150)) |
| 3862.590 | 60.6 | 0.307 | 0.19 | 3862.580 | Si II(1)3862.595(200h),Cr I(K) 3862.54(30) |
| 3862.749 | 8.2 | 0.033 | 0.23 | 3862.739 | Ti I(175)3862.823(10n) |
| 3863.075 | 9.5 | 0.058 | 0.15 | 3863.065 | Ni I(181)3863.072((5)) |
| 3863.410 | 16.7 | 0.070 | 0.22 | 3863.400 | Fe II(152)3863.413(1),Nd II(26) 3863.33,.40(3700) |
| 3863.744 | 72.0 | 0.342 | 0.20 | 3863.734 | Fe I(280)3863.7413(2),V II (33) 3863.81(60),Cr I(K)3863.68(15wh) |
| 3863.962 | 16.7 | 0.070 | 0.22 | 3863.952 | Fe II(127,152)3863.953(1) |

Sigma Bootis Line Identifications from Reticon Exposures

3860 Å Region

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|---|---|---|---|---|---|---|
| 3826.646 | 2.5 | 0.020 | 0.12 | 3826.636 | Fe I(176)3826.6261(p) |
| 3826.864 | 22.9 | 0.126 | 0.17 | 3826.854 | Fe I(283)3826.8415(1) |
| 3827.077 | 7.0 | 0.034 | 0.19 | 3827.067 | Fe II(153)3827.079(4) |
| 3827.323 | 3.9 | 0.027 | 0.14 | 3827.313 | |
| 3827.594 | 39.8 | 0.220 | 0.17 | 3827.584 | Fe I(284)3827.5716(1) |
| 3827.846 | 161.8 | 0.614 | 0.25 | 3827.836 | Fe I(45)3827.8226(75r) |
| 3828.155 | 26.2 | 0.118 | 0.21 | 3828.145 | Ti I(189)3828.180(3) |
| 3828.545 | 13.9 | 0.081 | 0.16 | 3828.535 | Fe I(n)3828.5040(1n),V I(9) 3828.559(60r) |
| 3829.196 | 48.9 | 0.126 | 0.36 | 3829.186 | Fe I(948)3829.125((1)) |
| 3829.390 | 190.2 | 0.603 | 0.30 | 3829.380 | Mg I(3)3829.3549(40) |
| 3829.733 | 44.0 | 0.182 | 0.23 | 3829.723 | Fe I(221)3829.7642((2)),Mn I(6) 3829.680(5) |
| 3830.070 | 11.7 | 0.047 | 0.23 | 3830.060 | Cr I(-)3830.03(150H) |
| 3830.833 | 54.7 | 0.212 | 0.24 | 3830.823 | Fe I(284)3830.8619(1),(Fe I(224) 3830.7574(1)) |
| 3831.055 | 2.1 | 0.029 | 0.07 | 3831.045 | Cr I(24)3831.032(35) |
| 3831.725 | 74.2 | 0.272 | 0.26 | 3831.715 | Ni I(31)3831.690(20) |
| 3832.314 | 261.0 | 0.640 | 0.38 | 3832.304 | Mg I(3)3829.2996,.3037(80r) |
| 3832.920 | 59.6 | 0.214 | 0.26 | 3832.910 | Ni I(1)3832.873(5),Y II(7) 3832.889(1100s) |
| 3833.310 | 55.0 | 0.243 | 0.21 | 3833.300 | Fe I(221)3833.3082(5) |
| 3833.908 | 9.2 | 0.067 | 0.13 | 3833.898 | Mn I(6)3833.865(500) |
| 3834.249 | 129.5 | 0.509 | 0.24 | 3834.239 | Fe I(20)3834.2225(100r) |
| 3835.396 | | | | 3835.386 | H9 3835.386 |
| 3836.086 | 23.9 | 0.165 | 0.14 | 3836.076 | Cr I(70)3836.08(60),Ti II(12) 3836.084(4) |
| 3836.336 | 29.6 | 0.142 | 0.20 | 3836.326 | Fe I(664)3836.3304(4) |
| 3836.783 | 29.0 | 0.129 | 0.21 | 3836.773 | Zr II(16)3836.76(60) |
| 3837.150 | 18.9 | 0.096 | 0.19 | 3837.140 | Fe I(222)3837.1350(1) |
| 3837.927 | 31.0 | 0.096 | 0.30 | 3837.917 | |
| 3838.310 | 260.0 | 0.670 | 0.36 | 3838.300 | Mg I(3)3838.2918,.2943(100r),Zr II (17)3838.28(5) |
| 3838.659 | 17.5 | 0.075 | 0.22 | 3838.649 | |
| 3839.258 | 58.9 | 0.249 | 0.22 | 3839.248 | Fe I(529)3839.2558(7) |
| 3839.619 | 32.9 | 0.168 | 0.18 | 3839.609 | Fe I(995)3839.614((2w)) |
| 3839.784 | 15.4 | 0.080 | 0.18 | 3839.774 | Mn I(6)3839.779(500h) |
| 3840.445 | 119.4 | 0.532 | 0.21 | 3840.435 | Fe I(20)3840.4375(80r) |
| 3840.668 | 45.2 | 0.085 | 0.50 | 3840.658 | Cr I(70)3840.69(8w),La II (28)3840.72 (600),V I(9)3849.752(100) |
| 3841.053 | 112.8 | 0.522 | 0.20 | 3841.043 | Fe I(45)3841.0480 (80r),Mn I (6)3841.074(600h) |
| 3841.259 | 47.9 | 0.181 | 0.25 | 3841.249 | Cr I(69)3841.277(50) |
| 3842.049 | 29.4 | 0.151 | 0.18 | 3842.039 | Cr I(70)3842.024(20W) |
| 3842.916 | 26.3 | 0.157 | 0.16 | 3842.906 | Fe I(221)3842.9887((1)),Fe I(222) 3842.8963(2) |
| 3843.038 | 41.8 | 0.260 | 0.15 | 3843.028 | Sc II(1)3843.000(4),Zr II(7)3843.03 (30) |
| 3843.259 | 84.9 | 0.377 | 0.21 | 3843.249 | Fe I(528)3843.2568(8) |
| 3843.733 | 45.7 | 0.134 | 0.32 | 3843.723 | (Cr I(87)3843.63(10)) |
| 3843.996 | 12.1 | 0.088 | 0.13 | 3843.986 | Mn I(6)3843.988(500h) |
| 3844.227 | 23.2 | 0.079 | 0.28 | 3844.217 | Ni I(137)3844.276((3N)) |
| 3844.551 | 5.4 | 0.032 | 0.16 | 3844.541 | Ni I(181)3844.58((3)) |
| 3844.917 | 3.1 | 0.033 | 0.09 | 3844.907 | |
| 3845.187 | 68.4 | 0.326 | 0.20 | 3845.177 | Fe I(124)3845.1689((5)) |
| 3845.479 | 70.3 | 0.341 | 0.19 | 3845.469 | Co I(34)3845.468(60) |
| 3845.700 | 28.2 | 0.157 | 0.17 | 3845.690 | Fe I(771)3845.695((1)) |
| 3845.990 | 36.0 | 0.151 | 0.22 | 3845.980 | Fe I(703)3845.9851((1w)) |