Telescopio Nazionale Galileo Instrumentation

Spettrografo ad Alta Risoluzione Galileo (SARG)

Thorium - Argon Atlas

Blue Cross Disperser (red CCD)

Spectral Range: λ (4311 – 5143)Å

DOCUMENT SARG – D036 II

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38700 Santa Cruz de la Palma

FORWARD

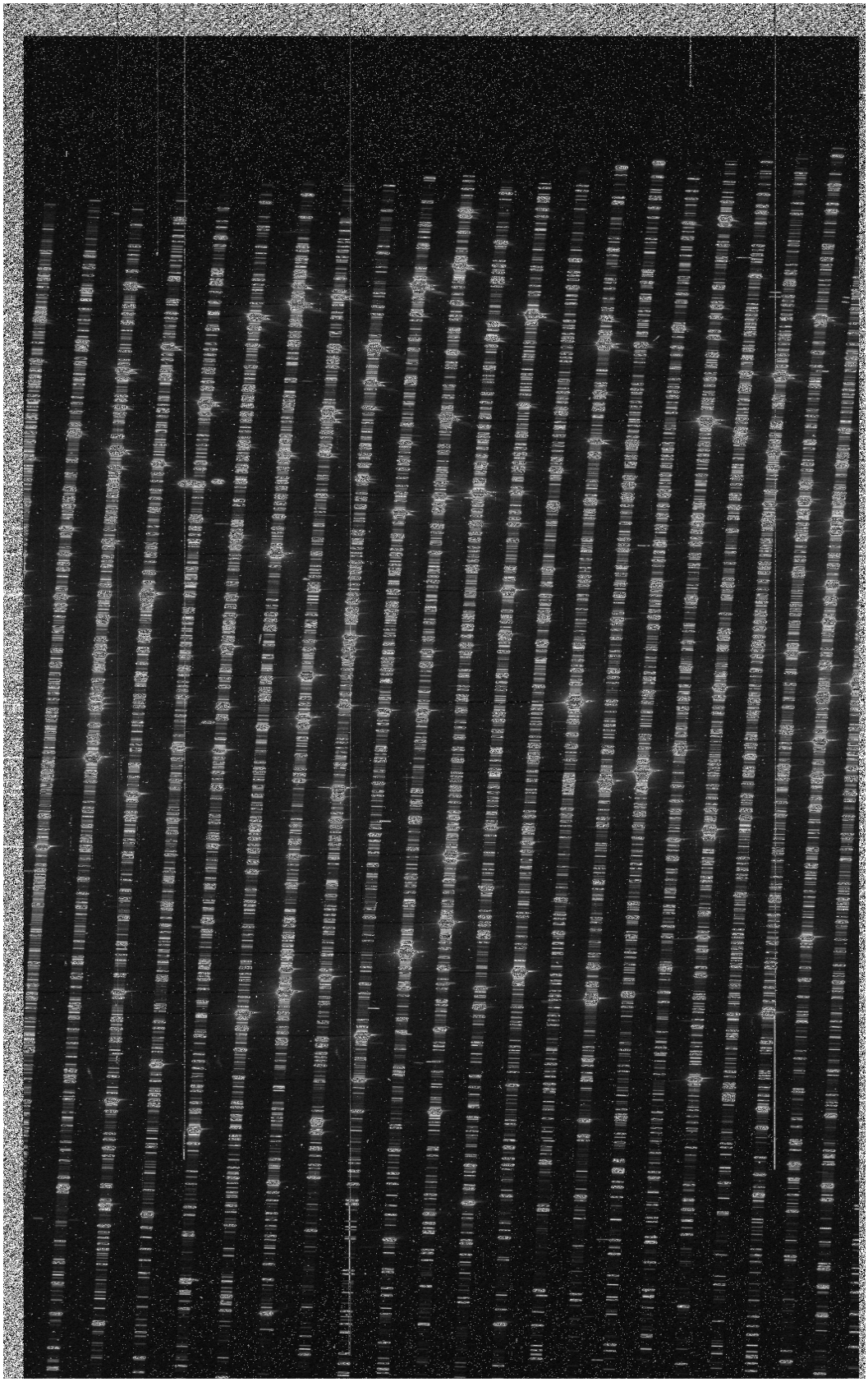
The Th-A atlas in the region ranging between the wavelengths 4311 Å and 5143 Å as imaged on the SARG red CCD with the blue grism (cross disperser 1) is presented.

The spectra were made exploiting the R= 164,000 slit and a 2×1 CCD binning. The trimming section of the blue CCD was:

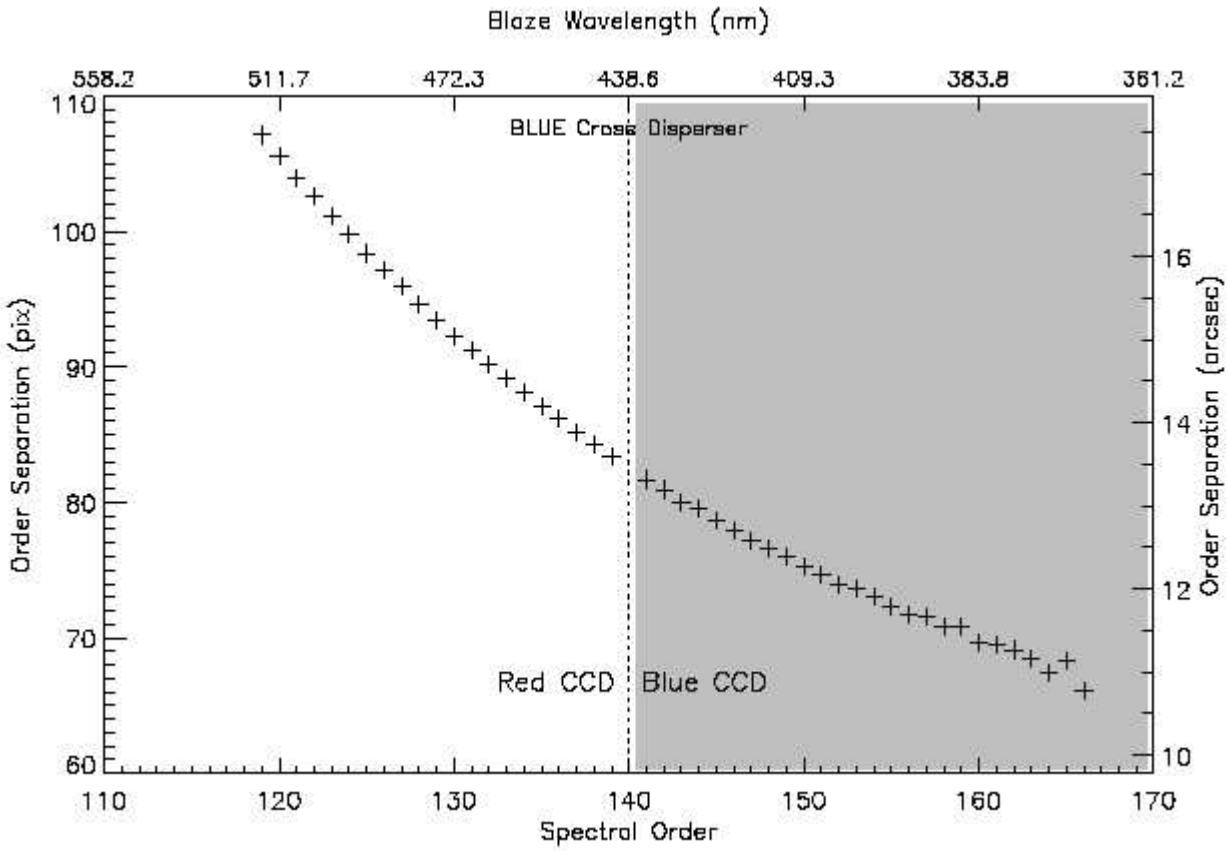
[1:1057;1:4197]

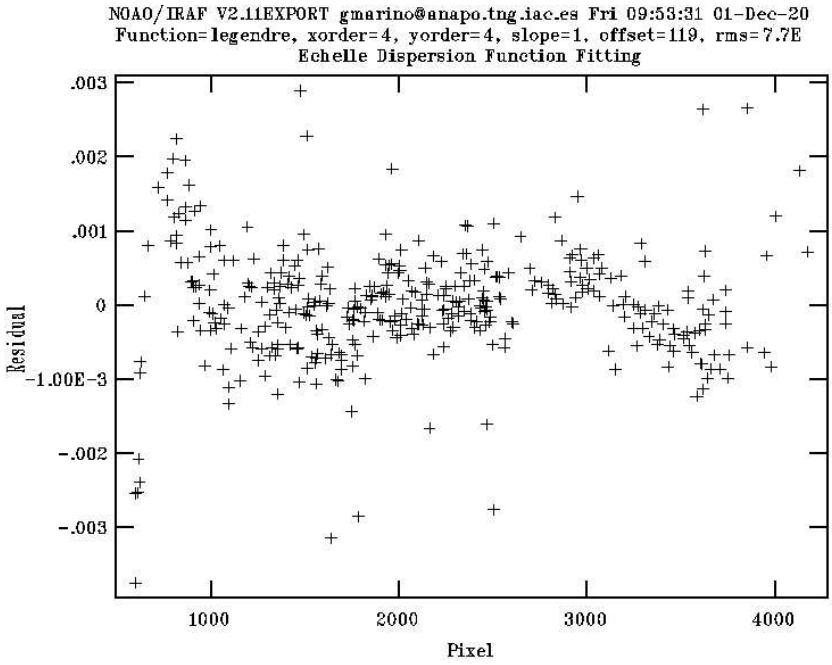
A set of information about the spectral formats is also given:

- a 2-D image of the blue CCD in 2×1 binning format (1100×4200 pixels) with the order position on to the CCD clearly indicated (the picture is enlarged in the X direction for clarity)
- a plot showing the change with the spectral order number of the separation between the order (together with the central wavelengths)
- a table listing: the aperture number (first column), the spectral order (second column), the central wavelength, corresponding to pixel 2048, the initial and ending wavelength, all in Å (third, fourth and fifth columns), the free spectral range (in Å), the average Δλ/pix, the spectral order separation at the centre of the order in pixels (the scale on detector is 0.16 arcsec/pixel). In the last column the number of the page where one can find the corresponding 1-D spectrum plot with the identification of some line.
- A plot showing the residuals of the wavelength solution


120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141

Ap.	**Order**	**λ_C**	**λ_1**	**λ_2**	**FSR**	**$\Delta\lambda$**	**Sep**	**Page**
	#		*(Å)*	*(Å)*	*(Å)*	*(Å/px)*	*(pix)*	
1	120	5116.7	5063.167	5142.581	42.6	0.018926	/	**8**
2	121	5074.4	5021.441	5100.200	41.9	0.018770	107.11	**9**
3	122	5032.8	4980.400	5058.511	41.3	0.018615	105.54	**10**
4	123	4991.9	4940.027	5017.498	40.6	0.018463	103.99	**11**
5	124	4951.7	4900.306	4977.144	39.9	0.018312	102.55	**12**
6	125	4912.0	4861.220	4937.433	39.3	0.018163	101.17	**13**
7	126	4873.1	4822.755	4898.351	38.7	0.018016	99.74	**14**
8	127	4834.7	4784.896	4859.883	38.1	0.017871	98.39	**15**
9	128	4796.9	4747.628	4822.014	37.5	0.017728	97.08	**16**
10	129	4759.7	4710.938	4784.730	36.9	0.017586	95.91	**17**
11	130	4723.1	4674.813	4748.017	36.3	0.017446	94.61	**18**
12	131	4687.1	4639.239	4711.864	35.8	0.017308	93.49	**19**
13	132	4651.6	4604.203	4676.257	35.2	0.017172	92.31	**20**
14	133	4616.6	4569.694	4641.184	34.7	0.017038	91.25	**21**
15	134	4582.1	4535.700	4606.633	34.2	0.016905	90.13	**22**
16	135	4548.2	4502.208	4572.593	33.7	0.016774	89.11	**23**
17	136	4514.7	4469.209	4539.052	33.2	0.016645	88.06	**24**
18	137	4481.8	4436.690	4505.999	32.7	0.016518	87.08	**25**
19	138	4449.3	4404.642	4473.425	32.2	0.016392	86.16	**26**
20	139	4417.3	4373.055	4441.318	31.8	0.016269	85.22	**27**
21	140	4385.7	4341.917	4409.668	31.3	0.016147	84.27	**28**
22	141	4354.6	4311.211	4378.467	30.9	0.016026	83.42	**29**


Blaze Wavelength (nm)
558.2
511.7
472.3
438.6
409.3
383.8
361.2
BLUE Cross Disperser
Red CCD
Blue CCD
Order Separation (pix)
Order Separation (arcsec)
Spectral Order
110
100
90
80
70
60
16
14
12
10
110
120
130
140
150
160
170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Echelle Dispersion Function Fitting
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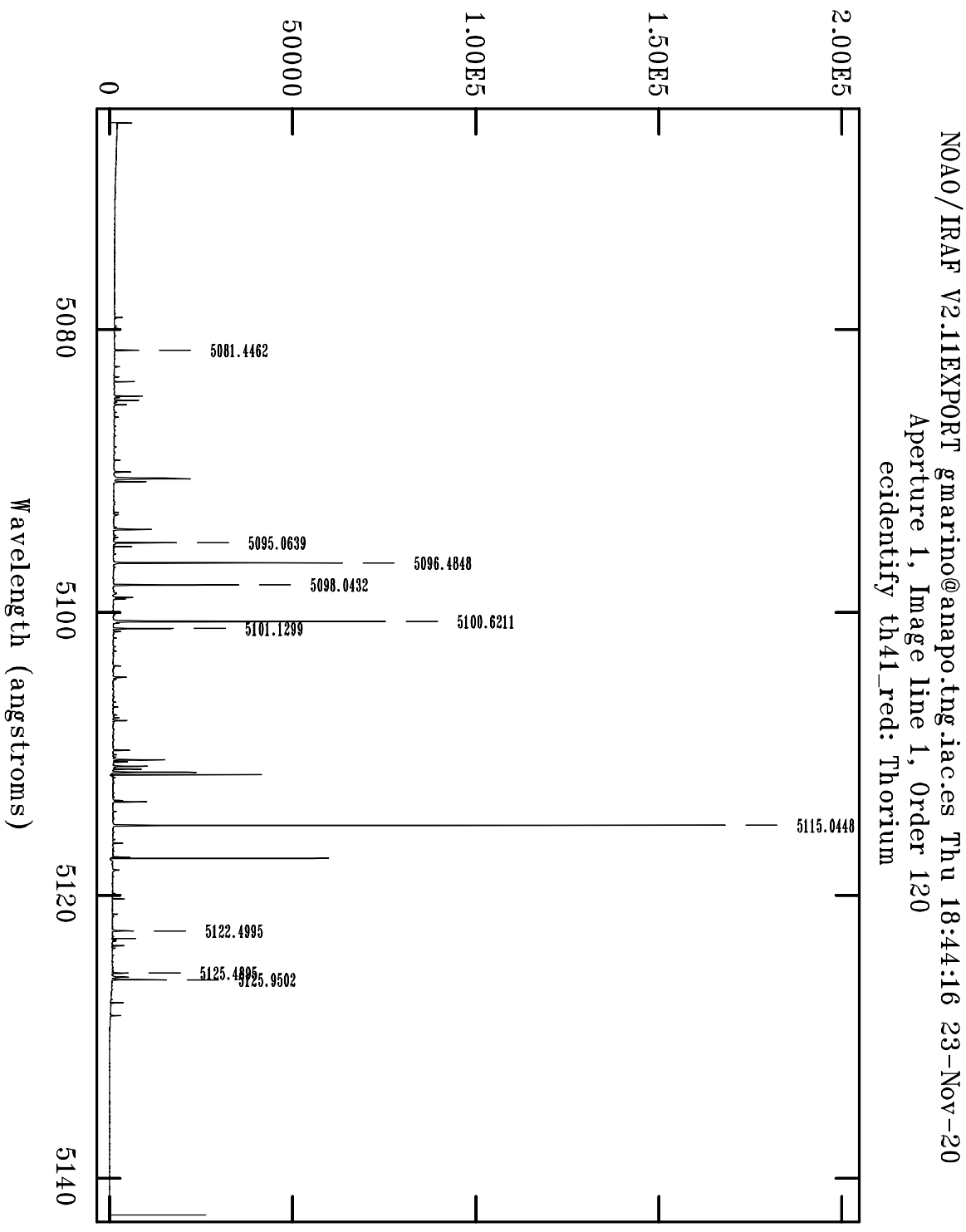
.002
.001
0
-1.00E-3
-.002
-.003
Residual
1000
2000
3000
4000
Pixel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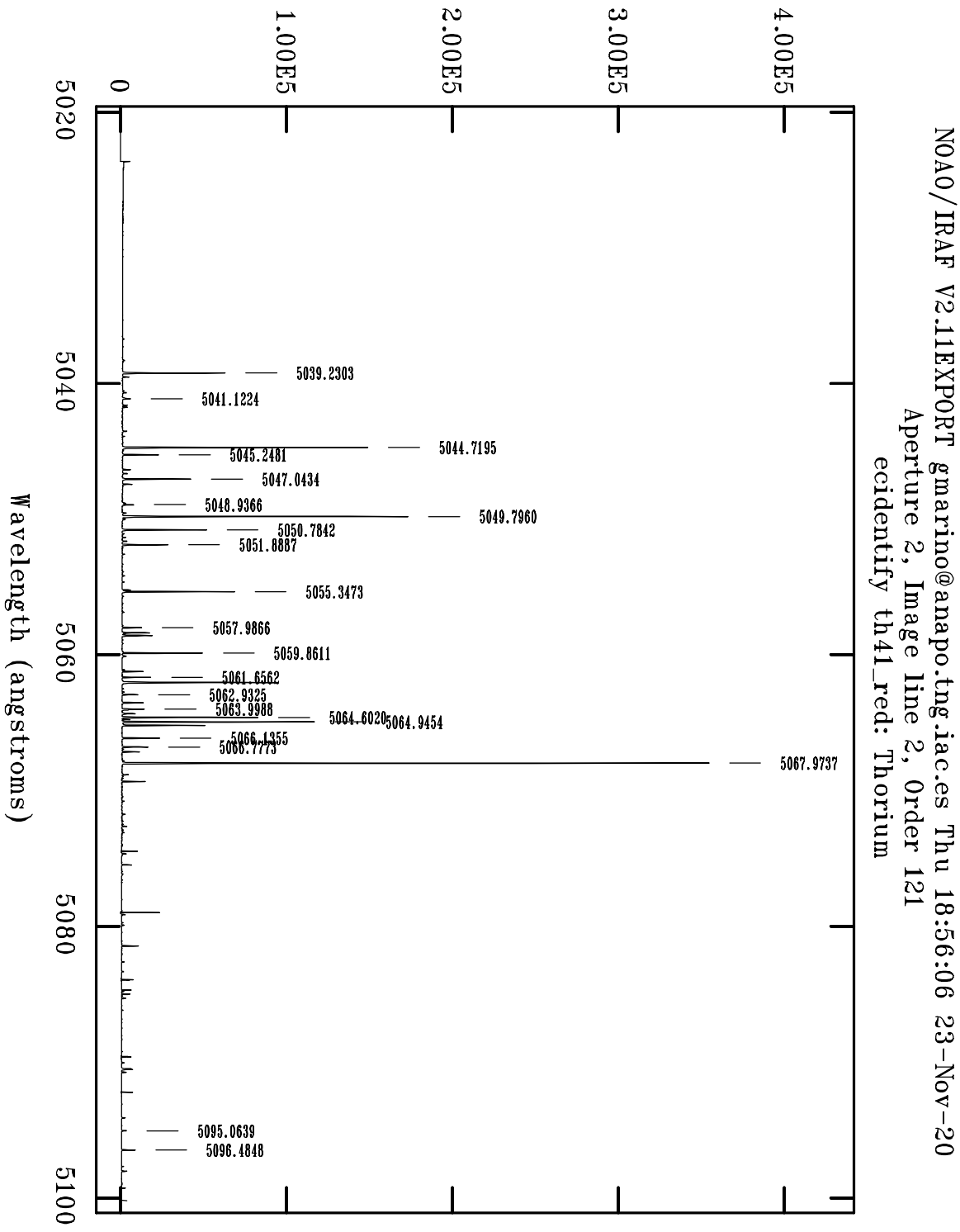
0
50000
1.00E5
1.50E5
2.00E5
5080
5100
5120
5140
Wavelength (angstroms)
5081.4462
5095.0639
5096.4848
5098.0432
5100.6211
5101.1299
5115.0448
5122.4995
5125.4895
5125.9502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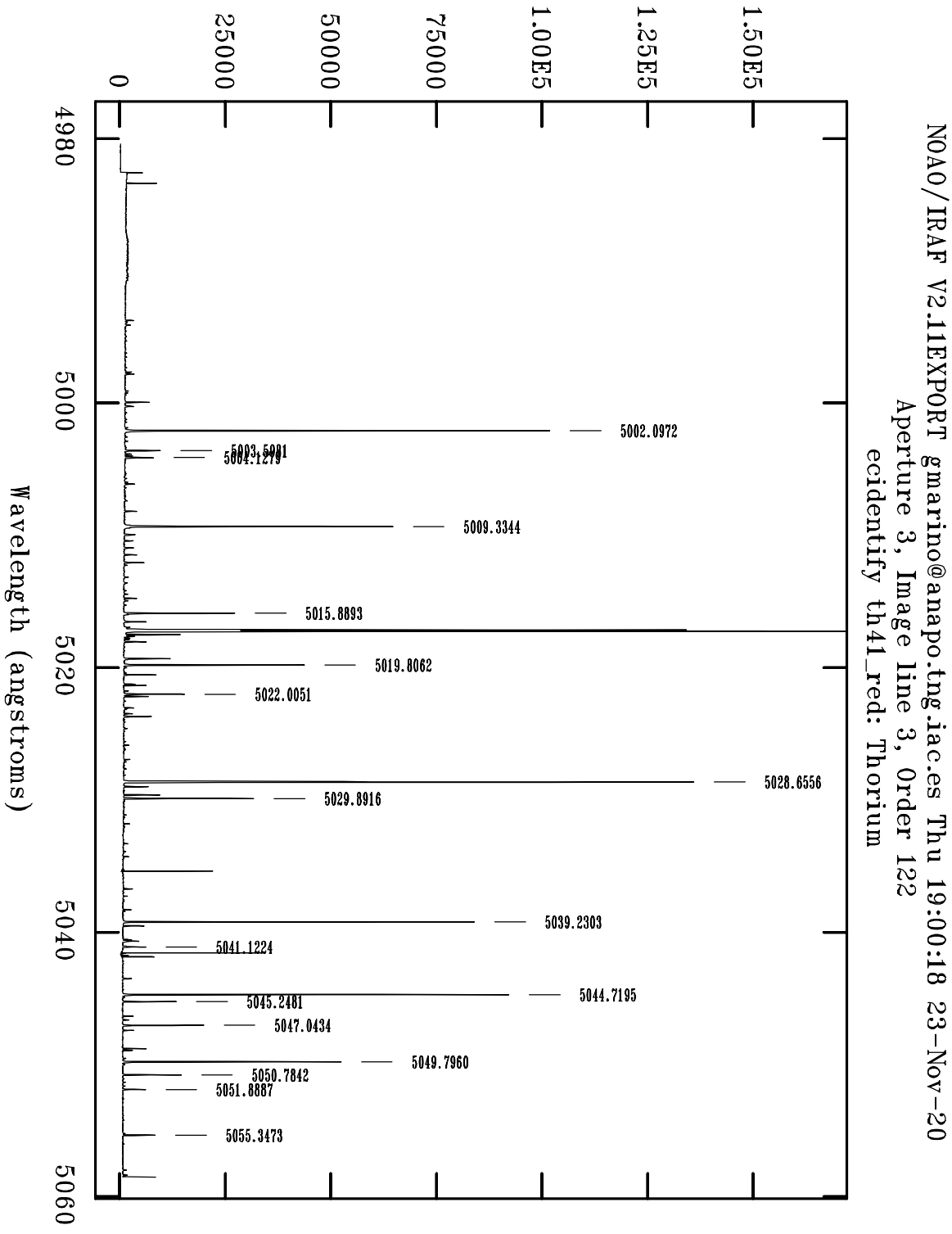
0
1.00E5
2.00E5
3.00E5
4.00E5
5020
5040
5060
5080
5100
Wavelength (angstroms)
5039.2303
5041.1224
5044.7195
5045.2481
5047.0434
5048.9366
5049.7960
5050.7842
5051.8887
5055.3473
5057.9866
5059.8611
5061.6562
5062.9325
5063.9988
5064.6020
5064.9454
5066.1355
5066.7773
5067.9737
5095.0639
5096.4848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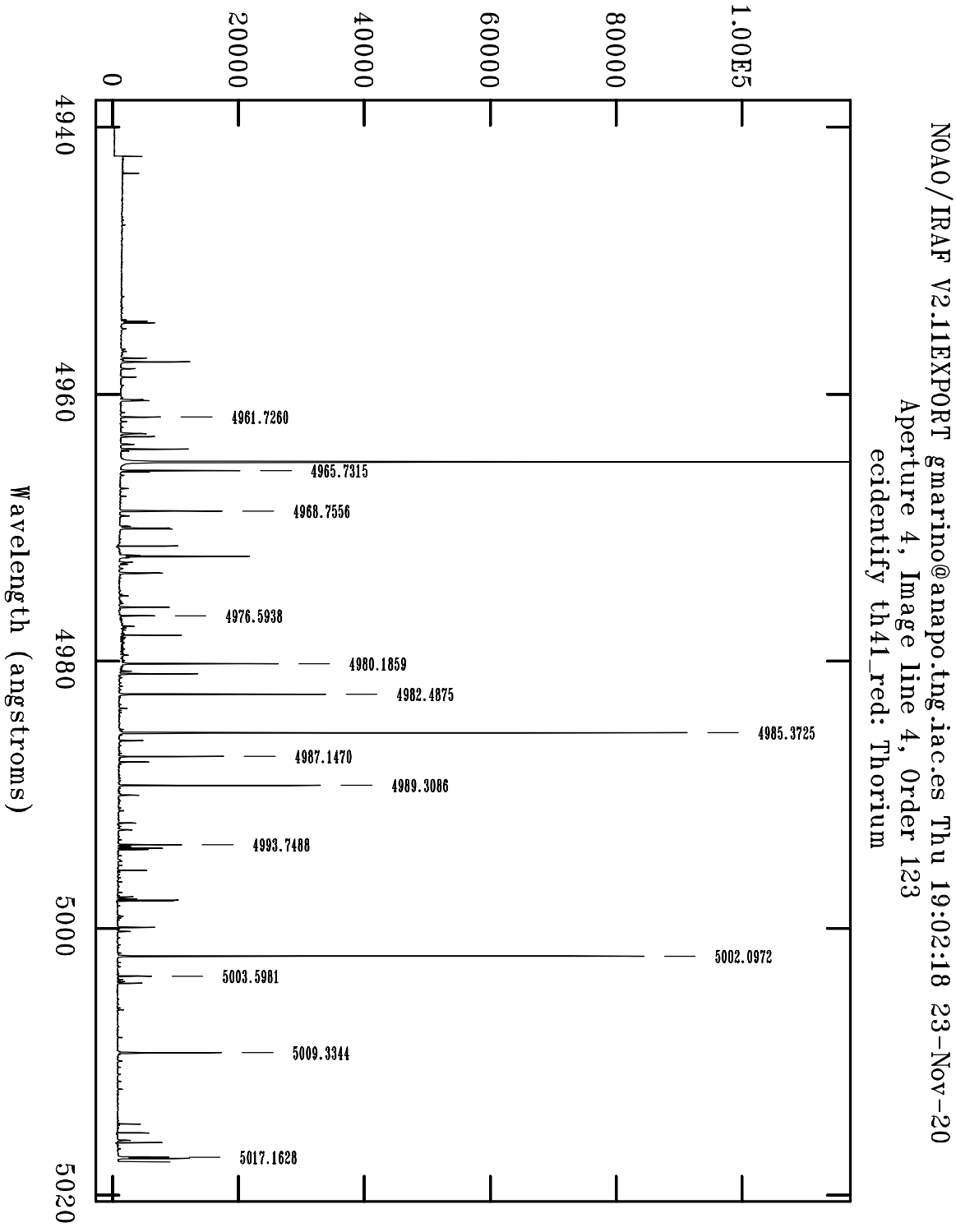
0
25000
50000
75000
1.00E5
1.25E5
1.50E5
4980
5000
5020
5040
5060
Wavelength (angstroms)
5002.0972
5003.5081
5004.1279
5009.3344
5015.8893
5019.8062
5022.0051
5028.6556
5029.8916
5039.2303
5041.1224
5044.7195
5045.2481
5047.0434
5049.7960
5050.7842
5051.8887
5055.3473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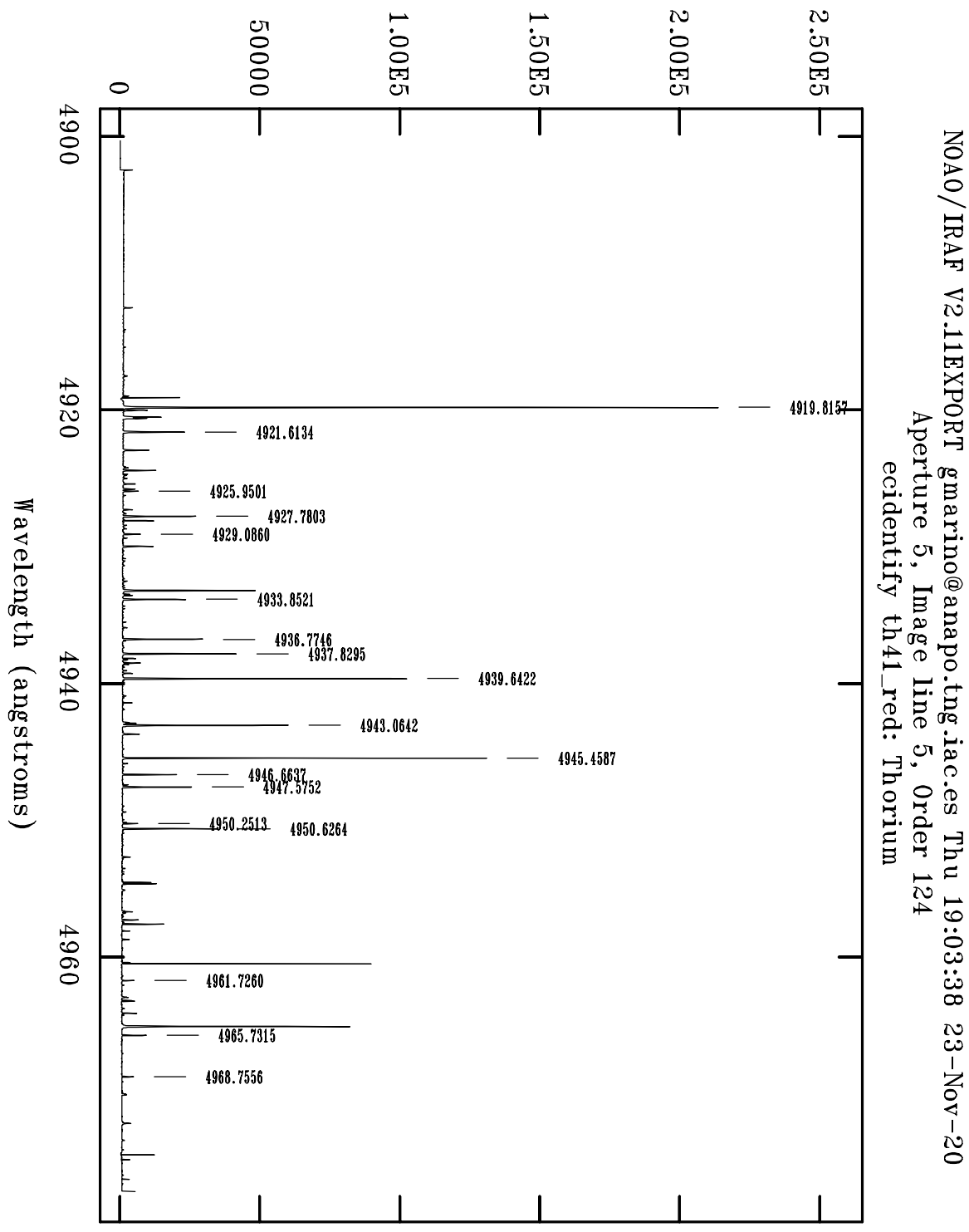
0
20000
40000
60000
80000
1.00E5
4940
4960
4980
5000
5020
Wavelength (angstroms)
4961.7260
4965.7315
4968.7556
4976.5938
4980.1859
4982.4875
4985.3725
4987.1470
4989.3086
4993.7488
5002.0972
5003.5981
5009.3344
5017.1628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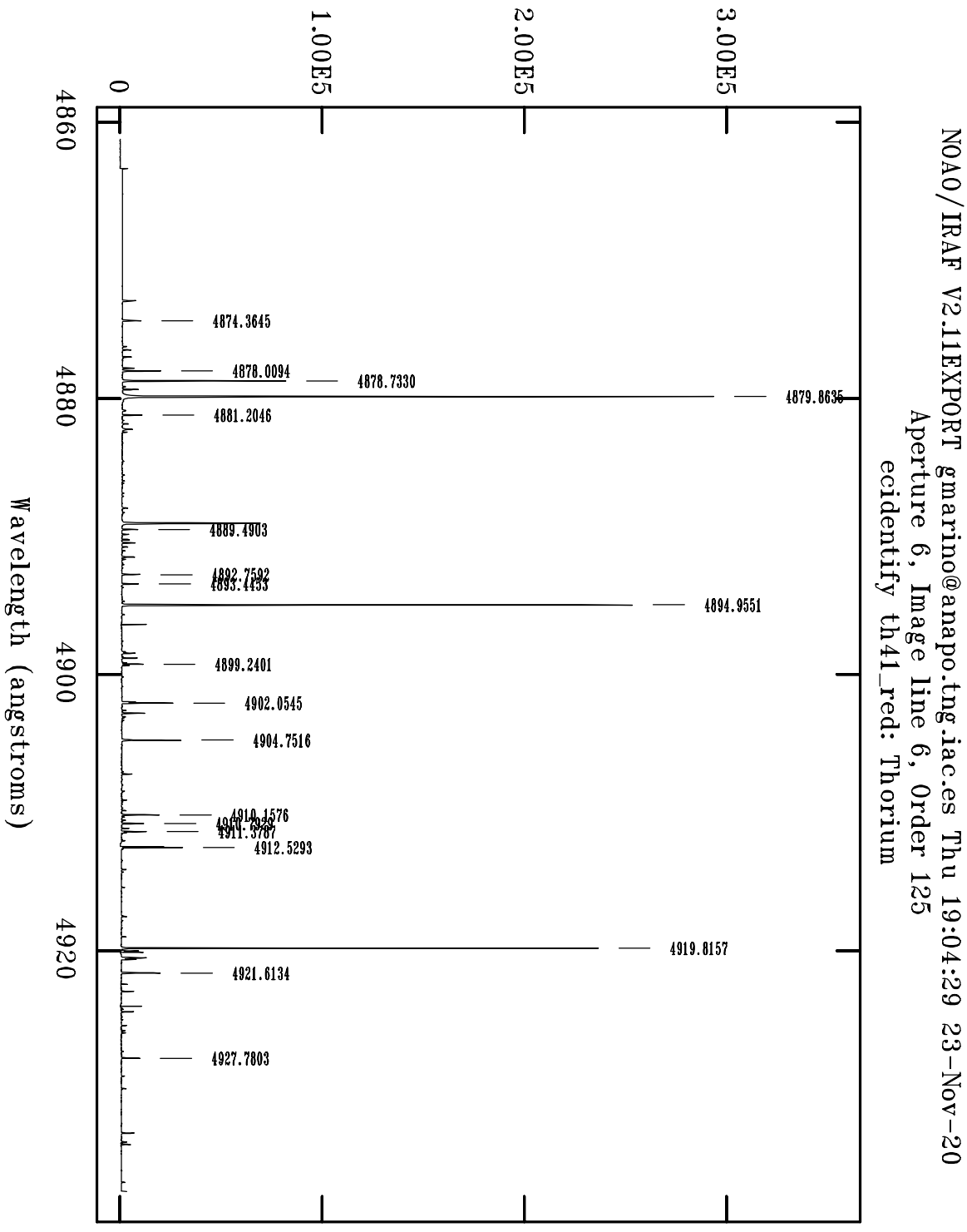
0
50000
1.00E5
1.50E5
2.00E5
2.50E5
4900
4920
4940
4960
Wavelength (angstroms)
4919.8157
4921.6134
4925.9501
4927.7803
4929.0860
4933.8521
4936.7746
4937.8295
4939.6422
4943.0642
4945.4587
4946.6637
4947.5752
4950.2513
4950.6264
4961.7260
4965.7315
4968.7556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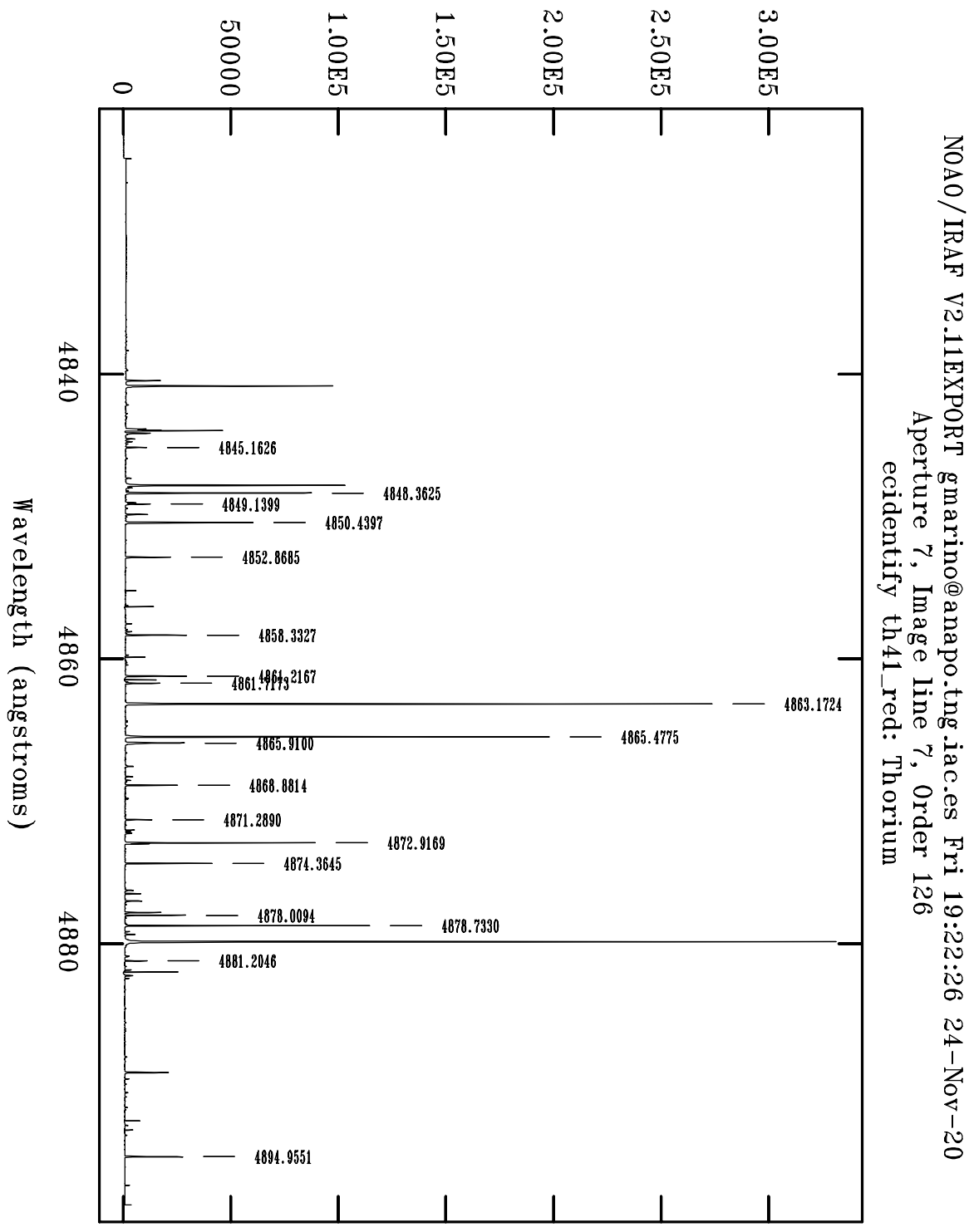
0
1.00E5
2.00E5
3.00E5
4860
4880
4900
4920
Wavelength (angstroms)
4874.3645
4878.0094
4878.7330
4879.8635
4881.2046
4889.4903
4894.9551
4899.2401
4902.0545
4904.7516
4910.1576
4912.5293
4919.8157
4921.6134
4927.7803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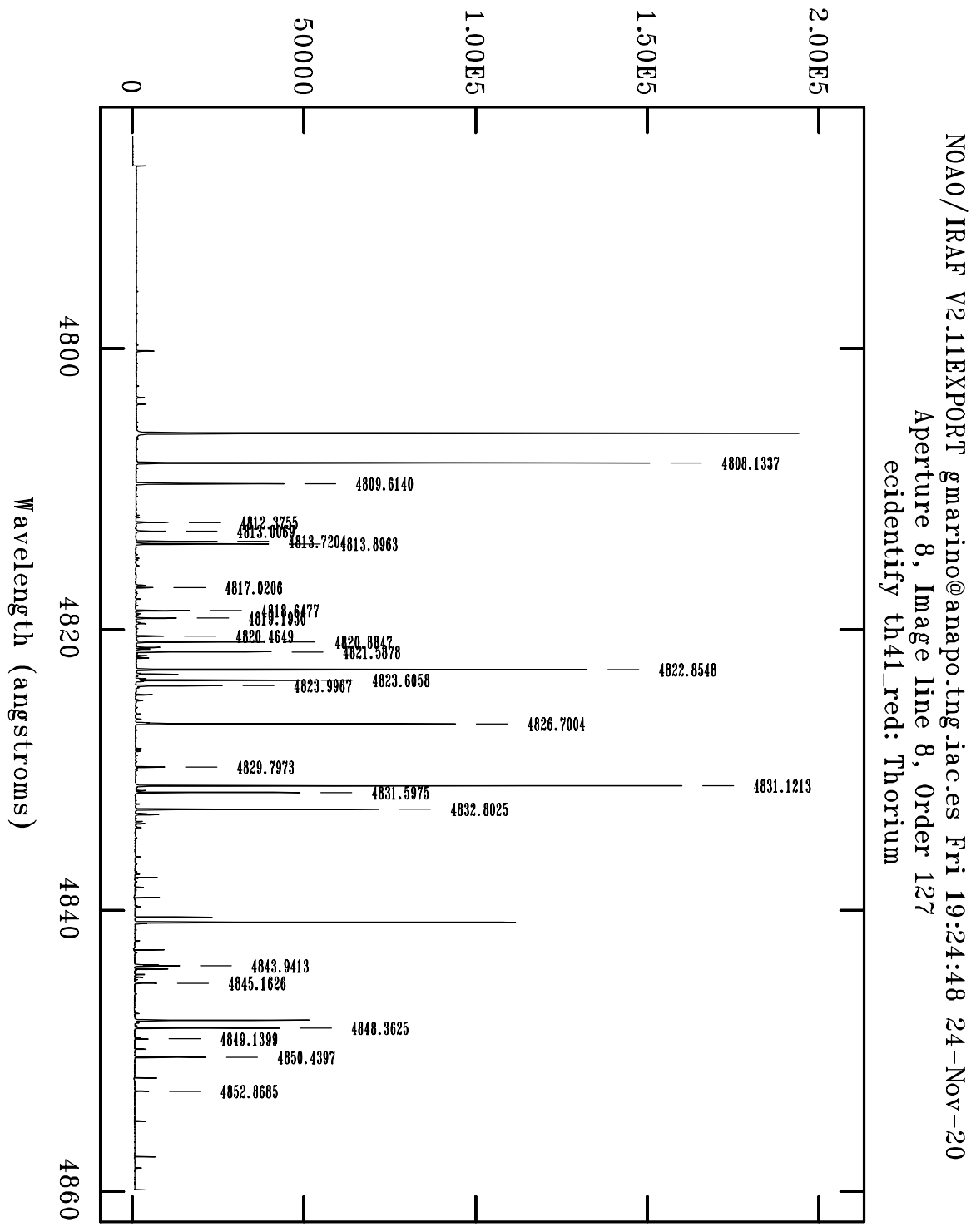
0
50000
1.00E5
1.50E5
2.00E5
2.50E5
3.00E5
4840
4860
4880
Wavelength (angstroms)
4845.1626
4848.3625
4849.1399
4850.4397
4852.8685
4858.3327
4861.7173
4863.1724
4865.4775
4865.9100
4868.8814
4871.2890
4872.9169
4874.3645
4878.0094
4878.7330
4881.2046
4894.9551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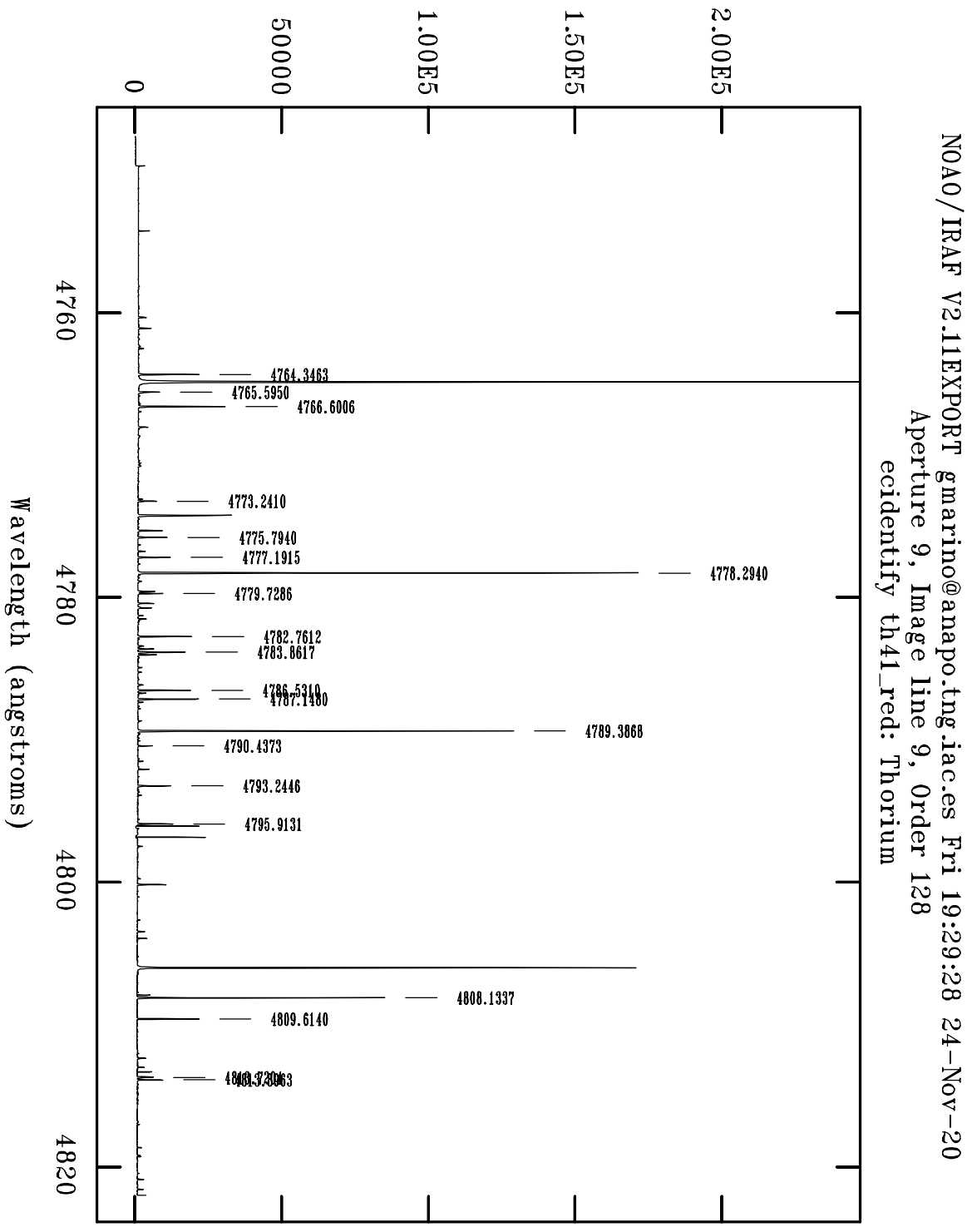
Aperture 8, Image line 8, Order 127
ecidentify th41_red: Thorium
0
50000
1.00E5
1.50E5
2.00E5
4800
4820
4840
4860
Wavelength (angstroms)
4808.1337
4809.6140
4812.3755
4813.0069
4813.7204
4813.8963
4817.0206
4818.6477
4819.1930
4820.4649
4820.8847
4821.5878
4822.8548
4823.6058
4823.9967
4826.7004
4829.7973
4831.1213
4831.5975
4832.8025
4843.9413
4845.1626
4848.3625
4849.1399
4850.4397
4852.8685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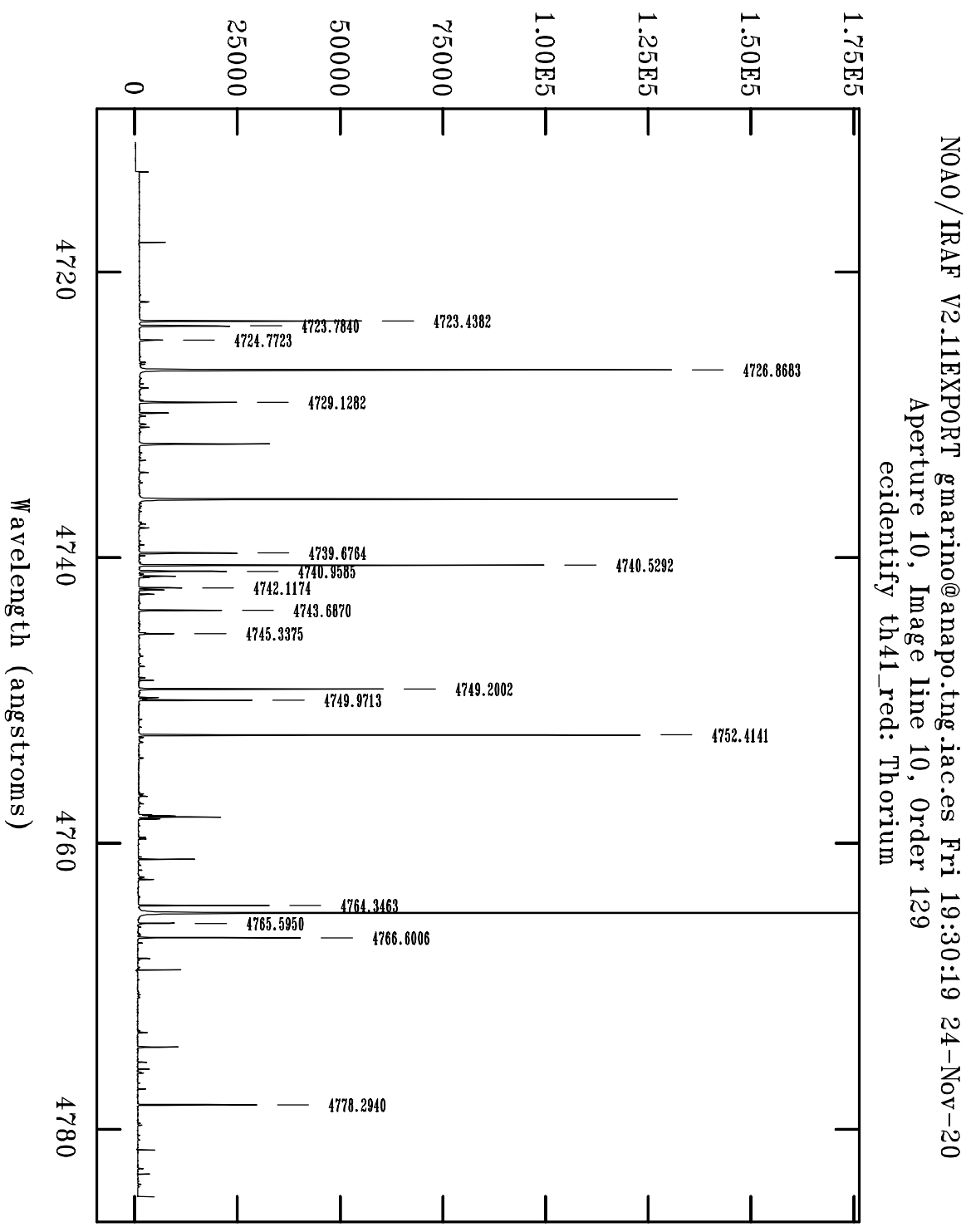
0
50000
1.00E5
1.50E5
2.00E5
4760
4780
4800
4820
Wavelength (angstroms)
4764.3463
4765.5950
4766.6006
4773.2410
4775.7940
4777.1915
4778.2940
4779.7286
4782.7612
4783.8617
4789.3868
4790.4373
4793.2446
4795.9131
4808.1337
4809.6140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Aperture 10, Image line 10, Order 129
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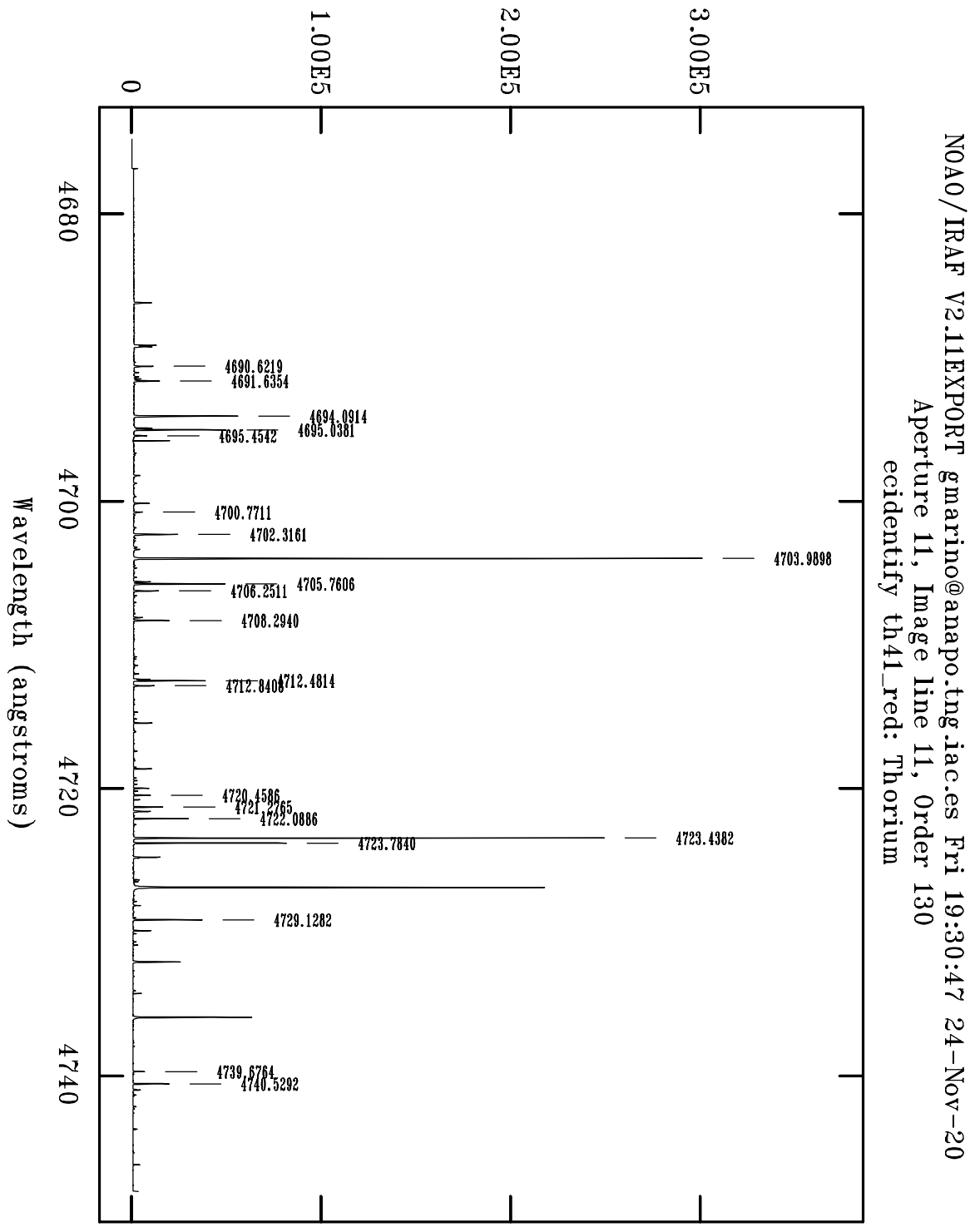
0
25000
50000
75000
1.00E5
1.25E5
1.50E5
1.75E5
4720
4740
4760
4780
Wavelength (angstroms)
4723.4382
4723.7640
4724.7723
4726.8683
4729.1282
4739.6764
4740.5292
4740.9585
4742.1174
4743.6870
4745.3375
4749.2002
4749.9713
4752.4141
4764.3463
4765.5950
4766.6006
4778.2940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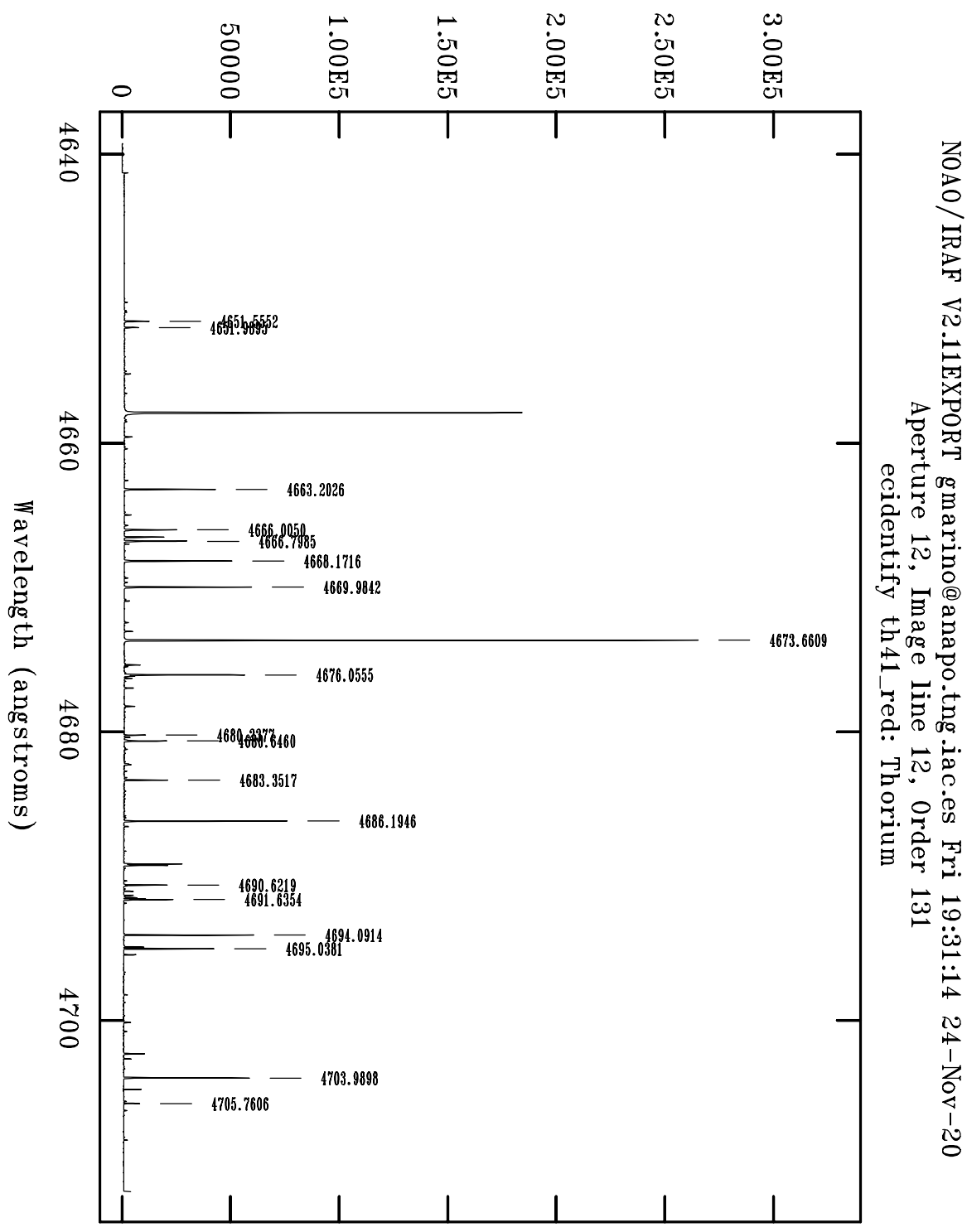
0
1.00E5
2.00E5
3.00E5
4680
4700
4720
4740
Wavelength (angstroms)
4690.6219
4691.6354
4694.0914
4695.0381
4695.4542
4700.7711
4702.3161
4703.9898
4705.7606
4706.2511
4708.2940
4712.4814
4712.8408
4720.4586
4721.2265
4722.0886
4723.4382
4723.7840
4729.1282
4739.6764
4740.5292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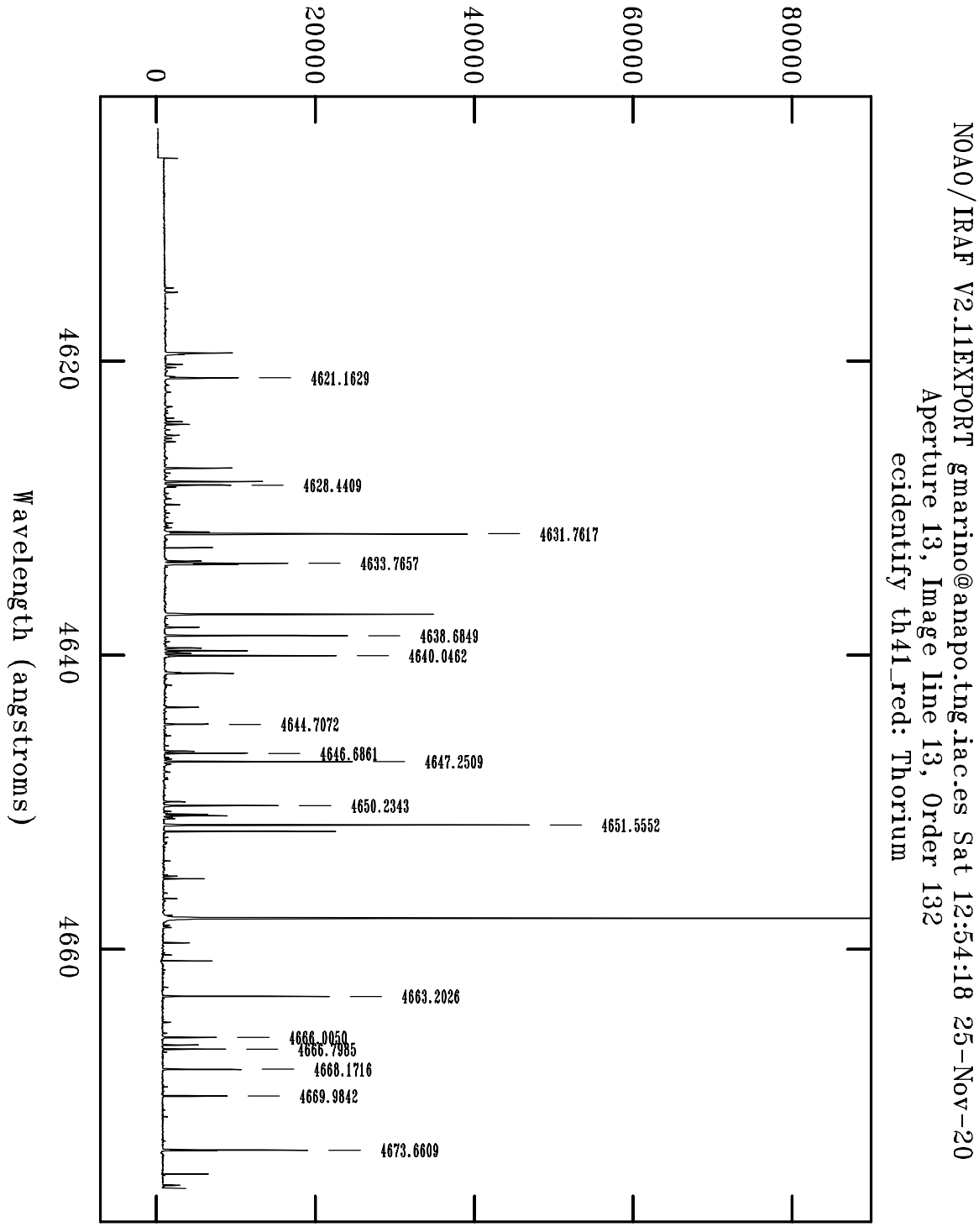
0
50000
1.00E5
1.50E5
2.00E5
2.50E5
3.00E5
4640
4660
4680
4700
Wavelength (angstroms)
4651.5552
4663.2026
4666.0050
4666.7985
4668.1716
4669.9842
4673.6609
4676.0555
4680.6460
4683.3517
4686.1946
4690.6219
4691.6354
4694.0914
4695.0381
4703.9898
4705.7606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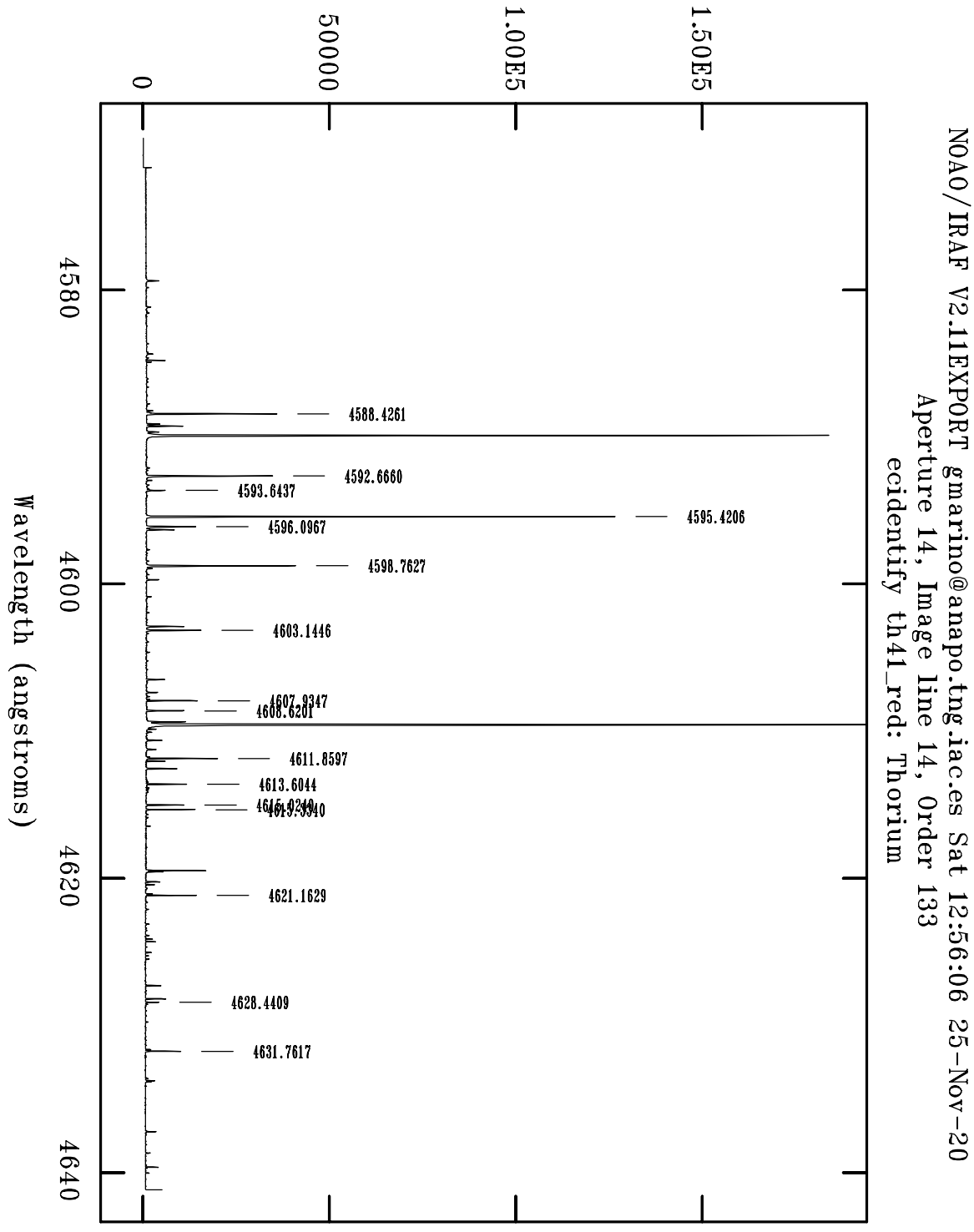
0
20000
40000
60000
80000
4620
4640
4660
Wavelength (angstroms)
4621.1629
4628.4409
4631.7617
4633.7657
4638.6849
4640.0462
4644.7072
4646.6861
4647.2509
4650.2343
4651.5552
4663.2026
4666.0050
4666.7985
4668.1716
4669.9842
4673.6609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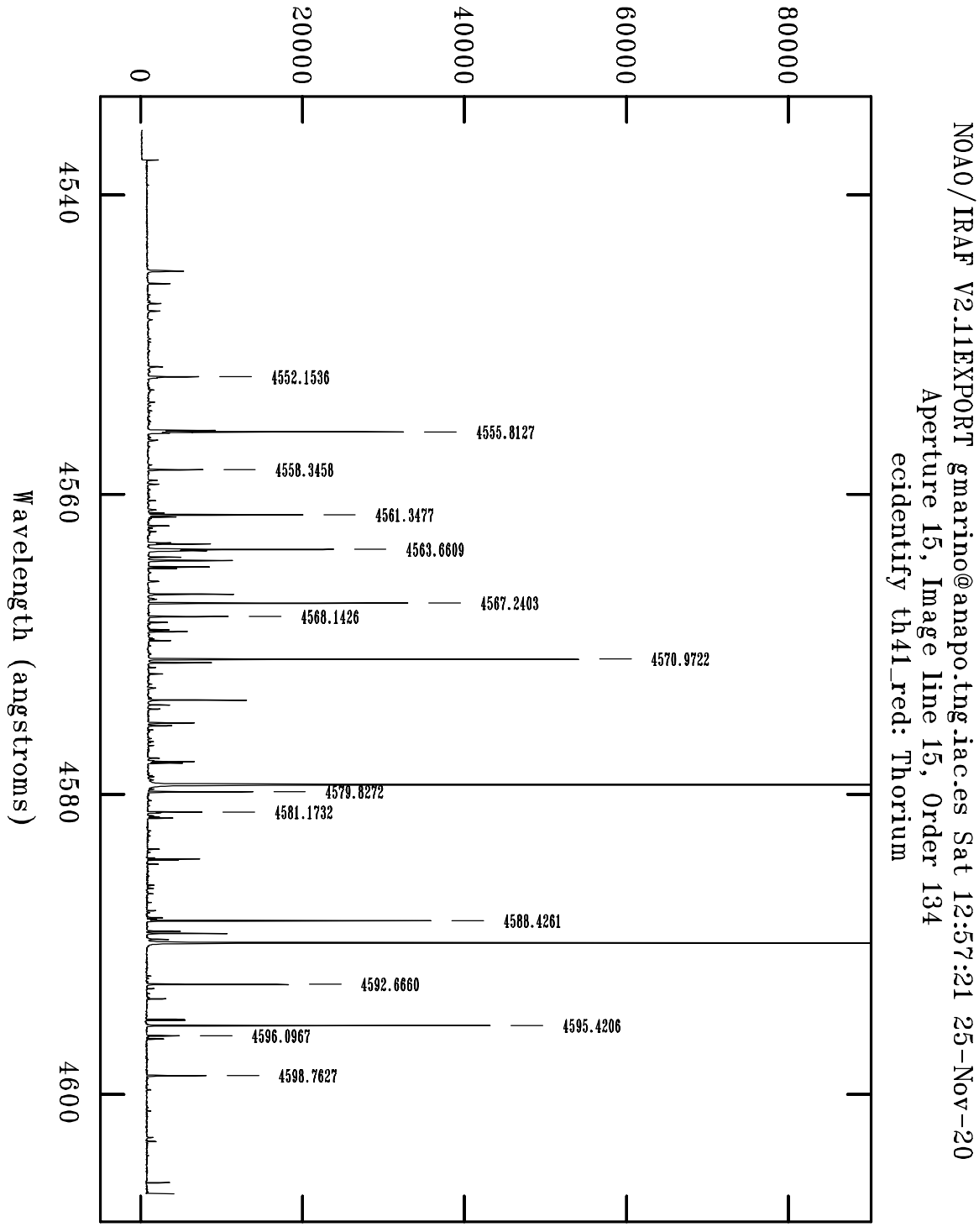
0
50000
1.00E5
1.50E5
4580
4600
4620
4640
Wavelength (angstroms)
4588.4261
4592.6660
4593.6437
4595.4206
4596.0967
4598.7627
4603.1446
4607.9347
4608.6201
4611.8597
4613.6044
4621.1629
4628.4409
4631.7617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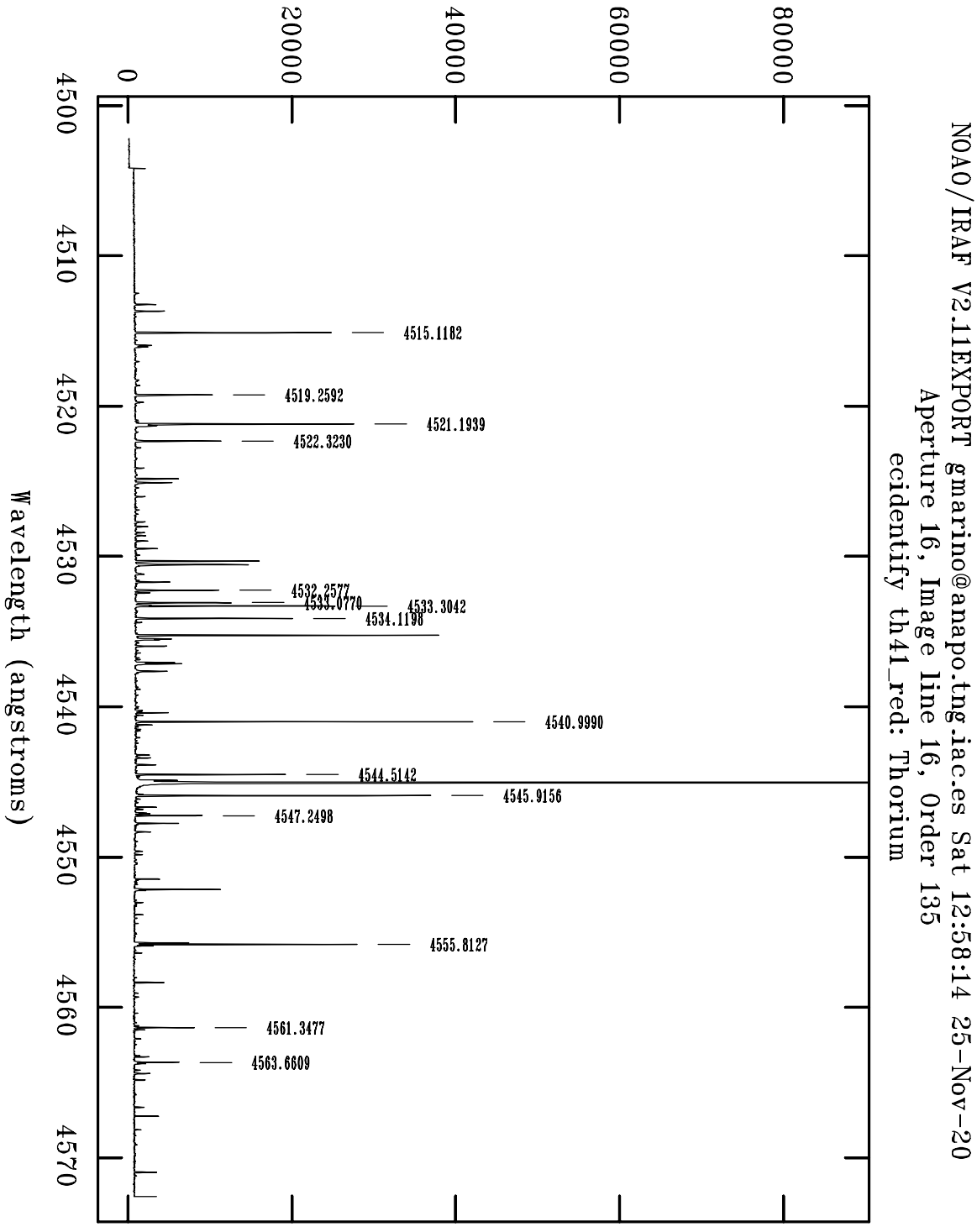
0
20000
40000
60000
80000
4540
4560
4580
4600
Wavelength (angstroms)
4552.1536
4555.8127
4558.3458
4561.3477
4563.6609
4567.2403
4568.1426
4570.9722
4579.8272
4581.1732
4588.4261
4592.6660
4595.4206
4596.0967
4598.7627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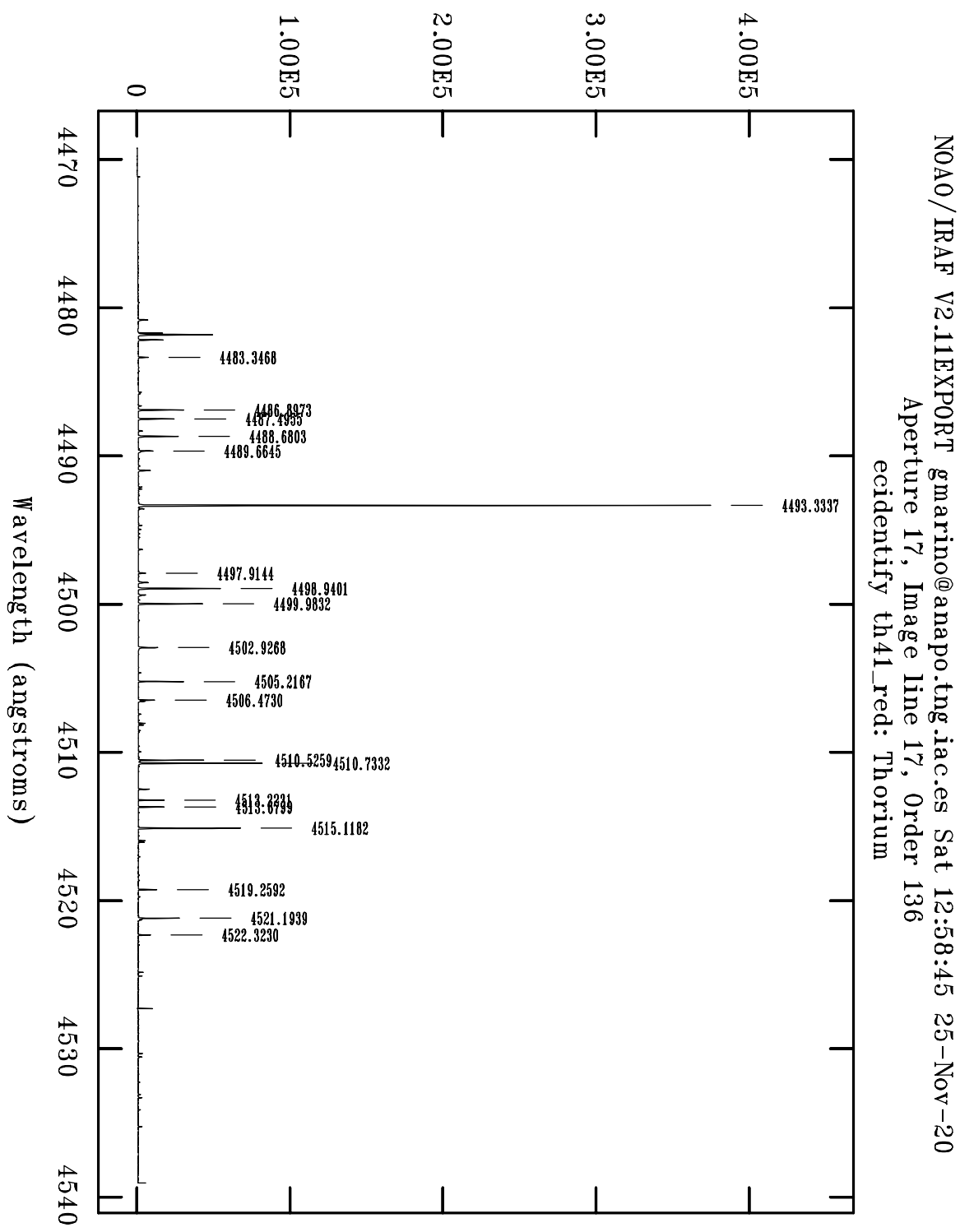
0
20000
40000
60000
80000
4500
4510
4520
4530
4540
4550
4560
4570
Wavelength (angstroms)
4515.1182
4519.2592
4521.1939
4522.3230
4532.2577
4533.0770
4533.3042
4534.1198
4540.9990
4544.5142
4545.9156
4547.2498
4555.8127
4561.3477
4563.6609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Aperture 17, Image line 17, Order 136
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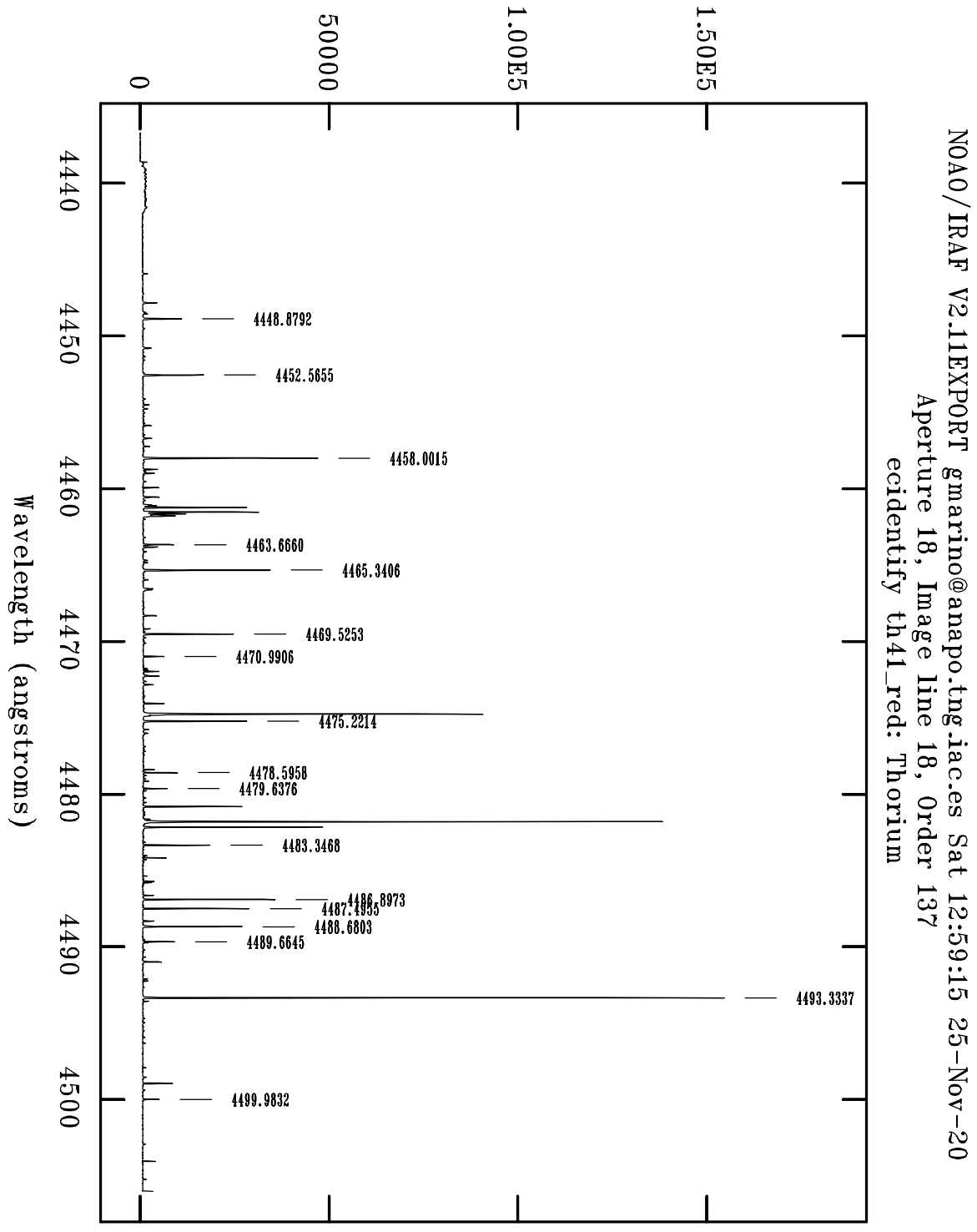
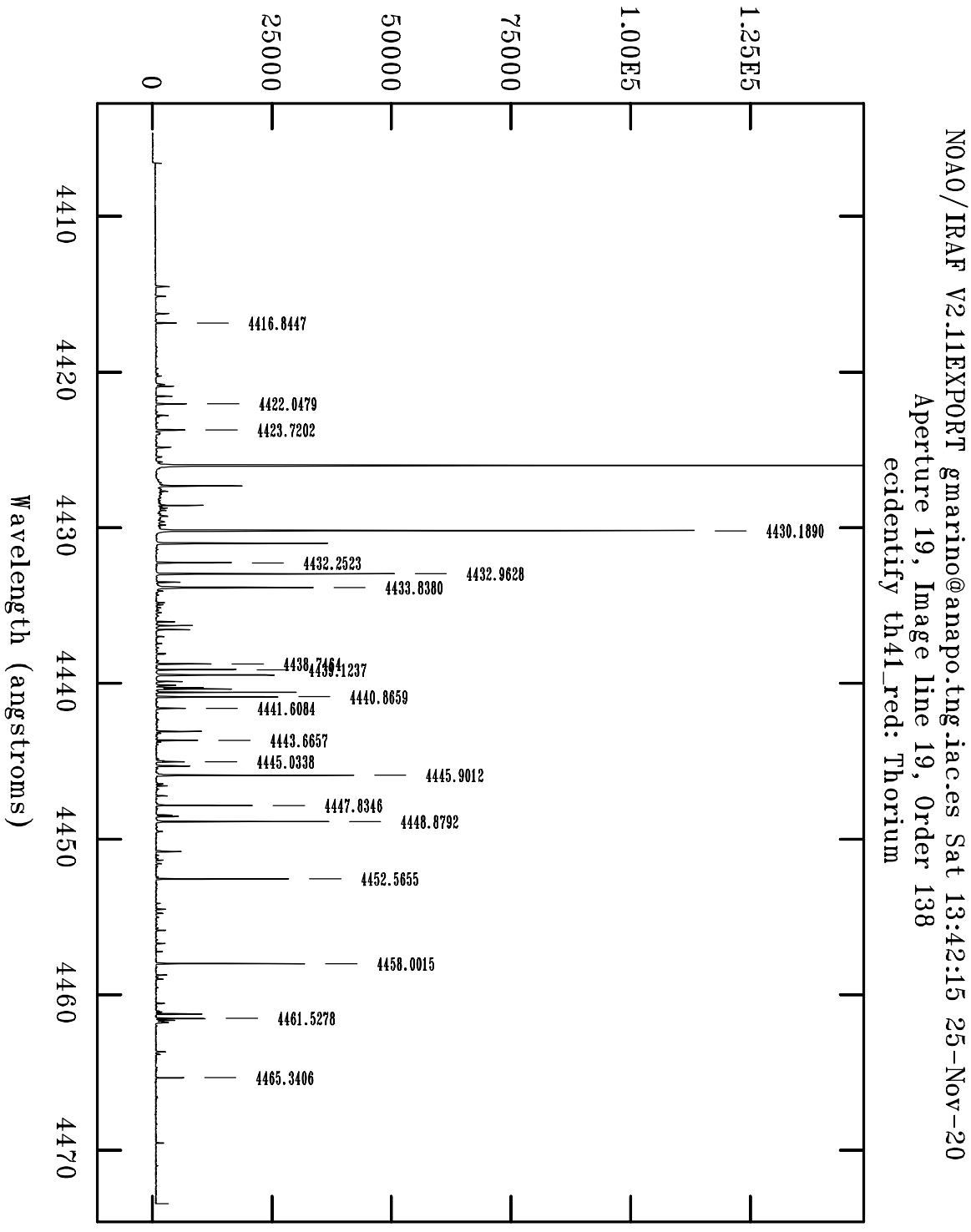
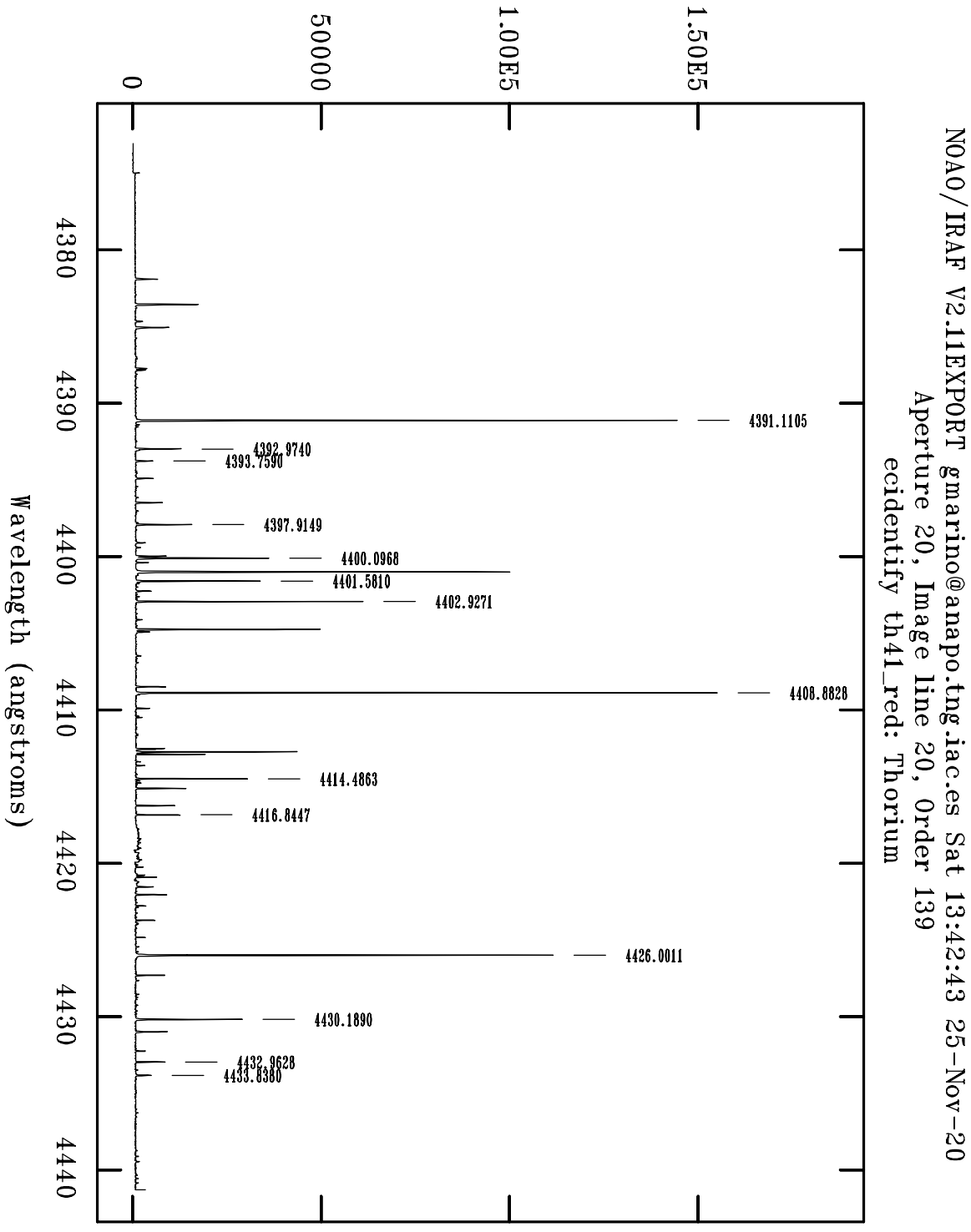
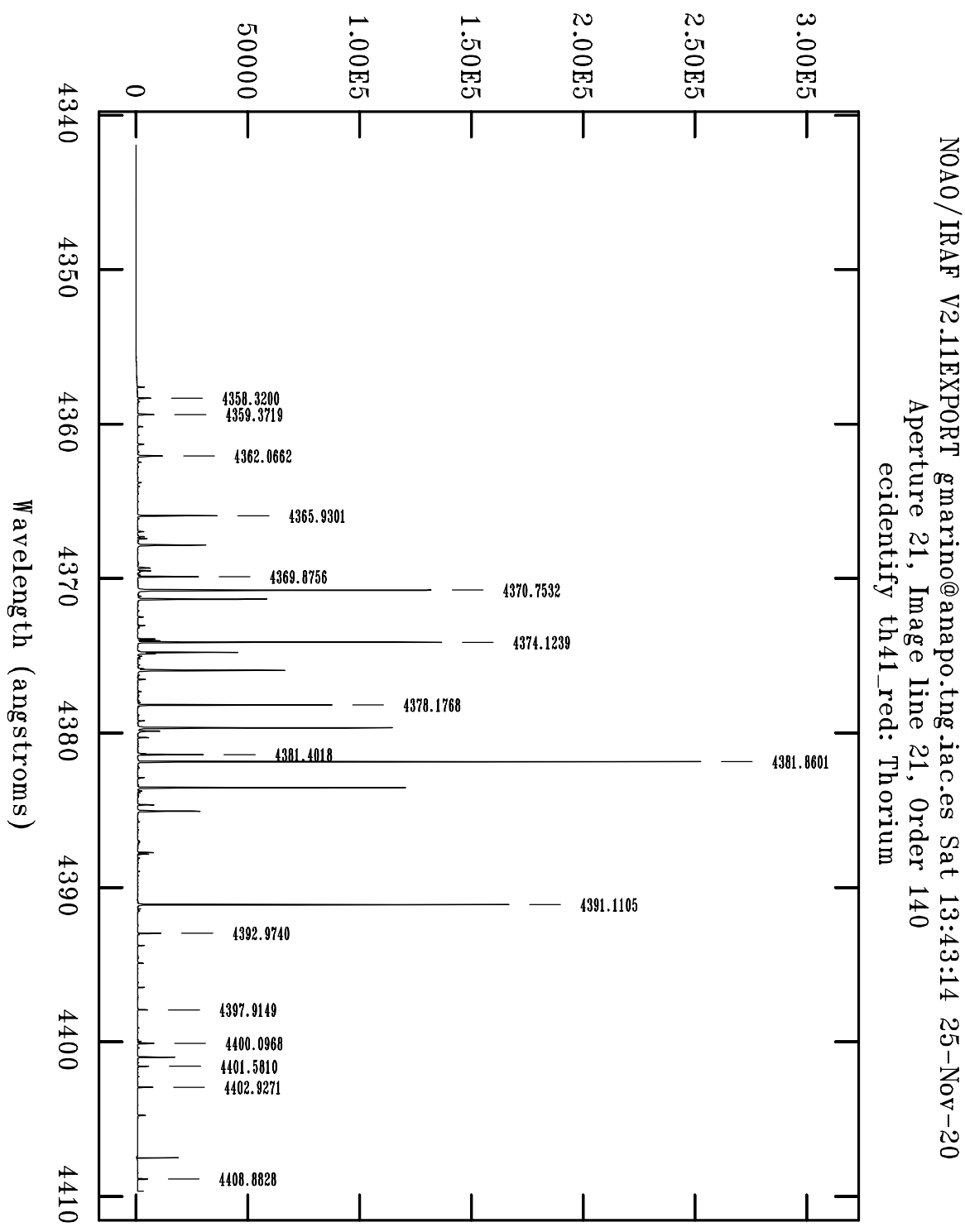
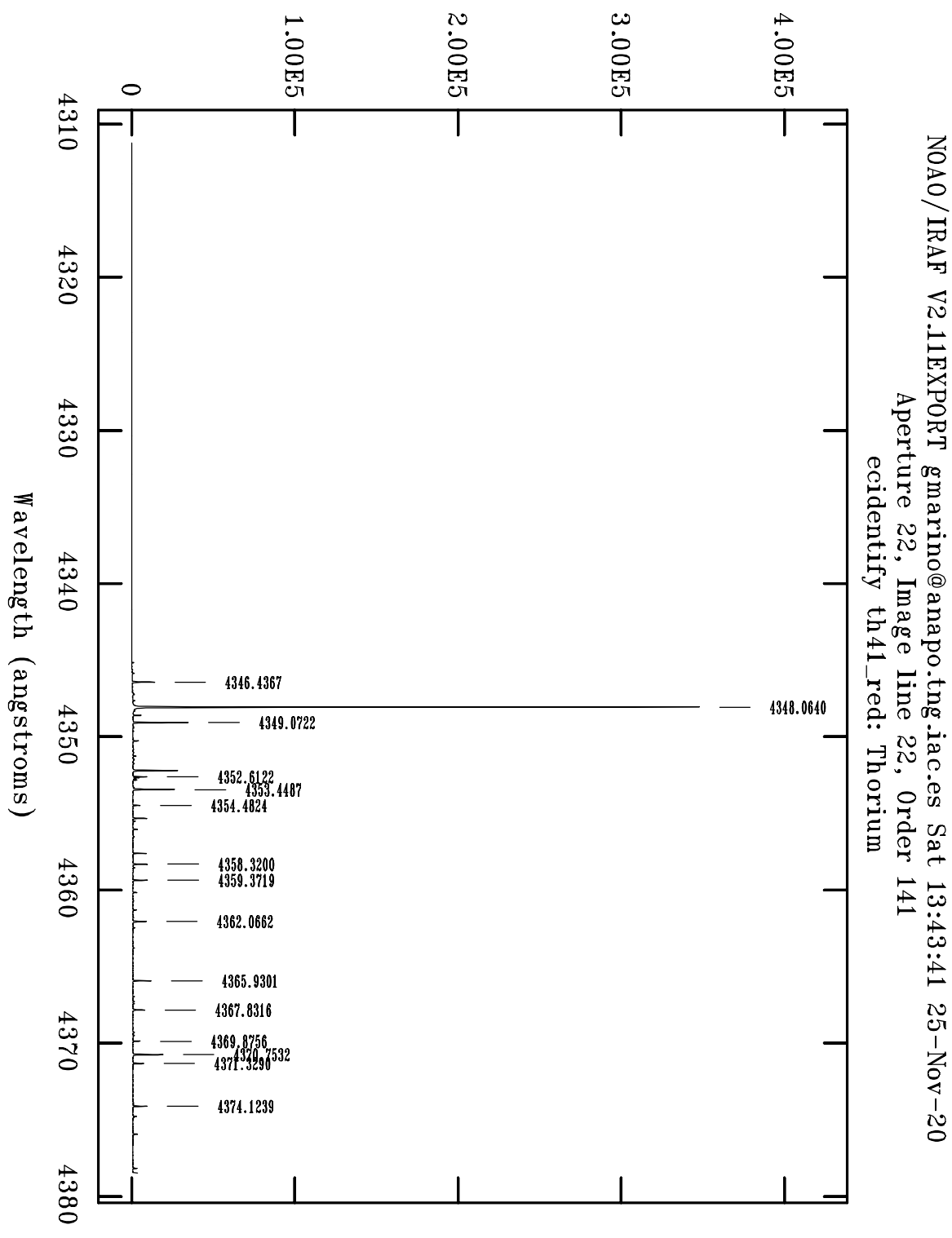
0
1.00E5
2.00E5
3.00E5
4.00E5
4470
4480
4490
4500
4510
4520
4530
4540
Wavelength (angstroms)
4483.3468
4486.8973
4487.4933
4488.6803
4489.6645
4493.3337
4497.9144
4498.9401
4499.9832
4502.9268
4505.2167
4506.4730
4510.5259
4510.7332
4513.3231
4513.6799
4515.1182
4519.2592
4521.1939
4522.3230


NOAO/IRAF V2.11EXPORT gmarino@anapo.tng.iac.es Sat 12:59:15 25-Nov-20
Aperture 18, Image line 18, Order 137
ecidentify th41_red: Thorium
0
50000
1.00E5
1.50E5
4440
4450
4460
4470
4480
4490
4500
Wavelength (angstroms)
4448.8792
4452.5655
4458.0015
4463.6660
4465.3406
4469.5253
4470.9906
4475.2214
4478.5958
4479.6376
4483.3468
4486.8973
4487.4955
4488.6803
4489.6645
4493.3337
4499.9832


NOAO/IRAF V2.11EXPORT gmarino@anapo.tng.iac.es Sat 13:42:15 25-Nov-20
Aperture 19, Image line 19, Order 138
ecidentify th41_red: Thorium
0
25000
50000
75000
1.00E5
1.25E5
4410
4420
4430
4440
4450
4460
4470
Wavelength (angstroms)
4416.8447
4422.0479
4423.7202
4430.1890
4432.2523
4432.9628
4433.8380
4438.7464
4439.1237
4440.8659
4441.6084
4443.6657
4445.0338
4445.9012
4447.8346
4448.8792
4452.5655
4458.0015
4461.5278
4465.3406


NOAO/IRAF V2.11EXPORT gmarino@anapo.tng.iac.es Sat 13:42:43 25-Nov-20
Aperture 20, Image line 20, Order 139
eidentify th41_red: Thorium
0
50000
1.00E5
1.50E5
4380
4390
4400
4410
4420
4430
4440
Wavelength (angstroms)
4391.1105
4392.9740
4393.7590
4397.9149
4400.0968
4401.5810
4402.9271
4408.8828
4414.4863
4416.8447
4426.0011
4430.1890
4432.9628
4433.8380


NOAO/IRAF V2.11EXPORT gmarino@anapo.tng.iac.es Sat 13:43:14 25-Nov-20
Aperture 21, Image line 21, Order 140
ecidentify th41_red: Thorium
Wavelength (angstroms)
0
50000
1.00E5
1.50E5
2.00E5
2.50E5
3.00E5
4340
4350
4360
4370
4380
4390
4400
4410
4358.3200
4359.3719
4362.0662
4365.9301
4369.8756
4370.7532
4374.1239
4378.1768
4381.4018
4381.8601
4391.1105
4392.9740
4397.9149
4400.0968
4401.5810
4402.9271
4408.8828


NOAO/IRAF V2.11EXPORT gmarino@anapo.tng.iac.es Sat 13:43:41 25-Nov-20
Aperture 22, Image line 22, Order 141
ecidentify th41_red: Thorium
0
1.00E5
2.00E5
3.00E5
4.00E5
4310
4320
4330
4340
4350
4360
4370
4380
Wavelength (angstroms)
4346.4367
4348.0640
4349.0722
4352.6122
4353.4487
4354.4824
4358.3200
4359.3719
4362.0662
4365.9301
4367.8316
4369.8756
4370.7532
4371.3290
4374.1239