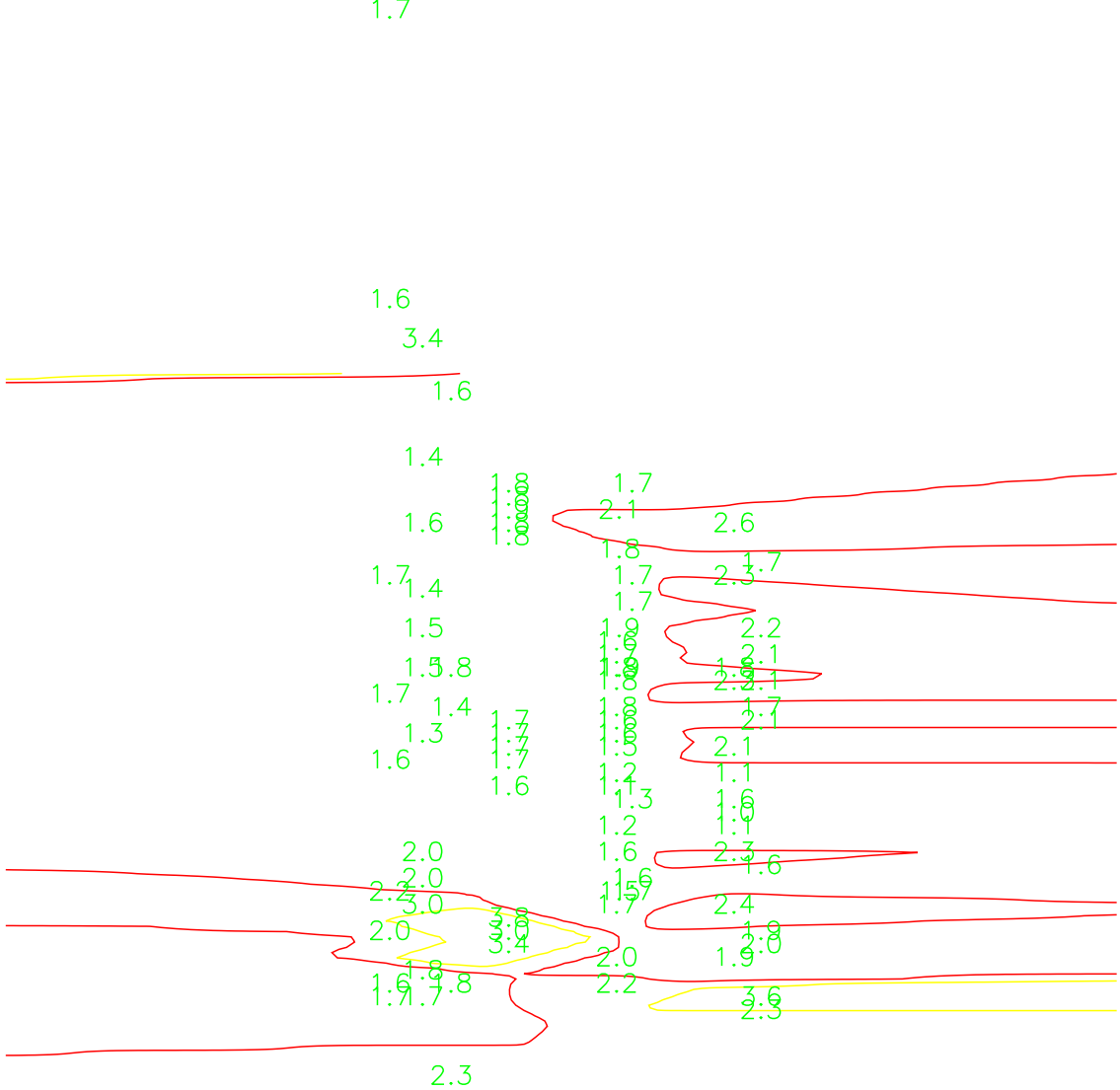
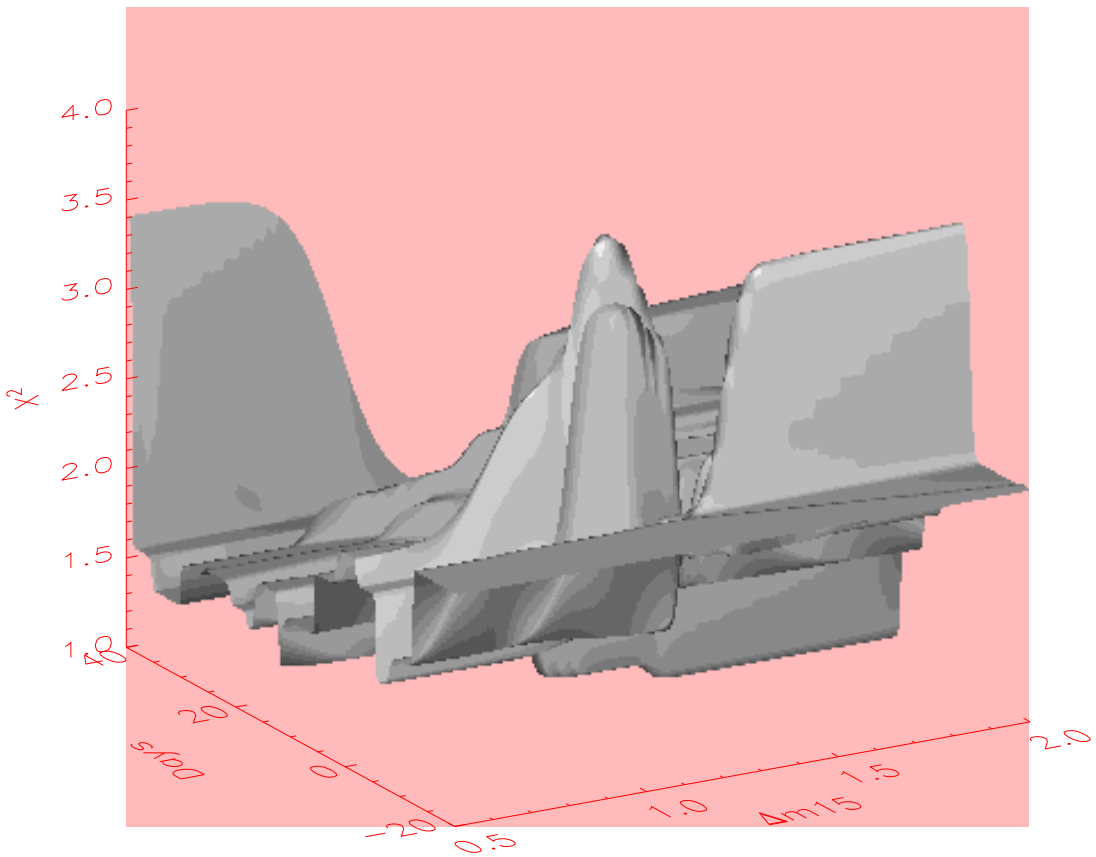
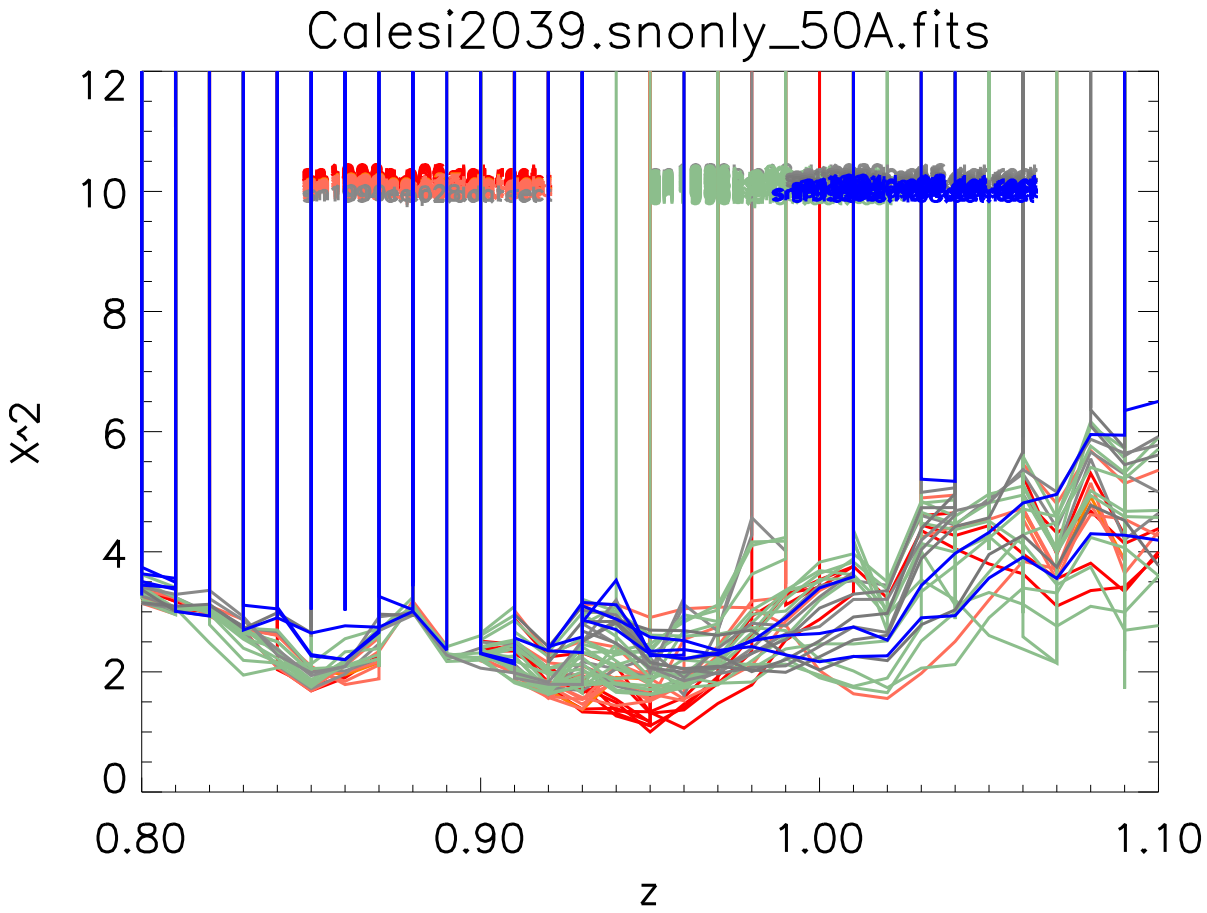




4.0
3.5
3.0
2.5
2.0
1.5
1.0
χ^2
40
20
0
−20
Days
0.5
1.0
1.5
2.0
Δm15


Calesi2039.snonly_50A.fits
X^2
z
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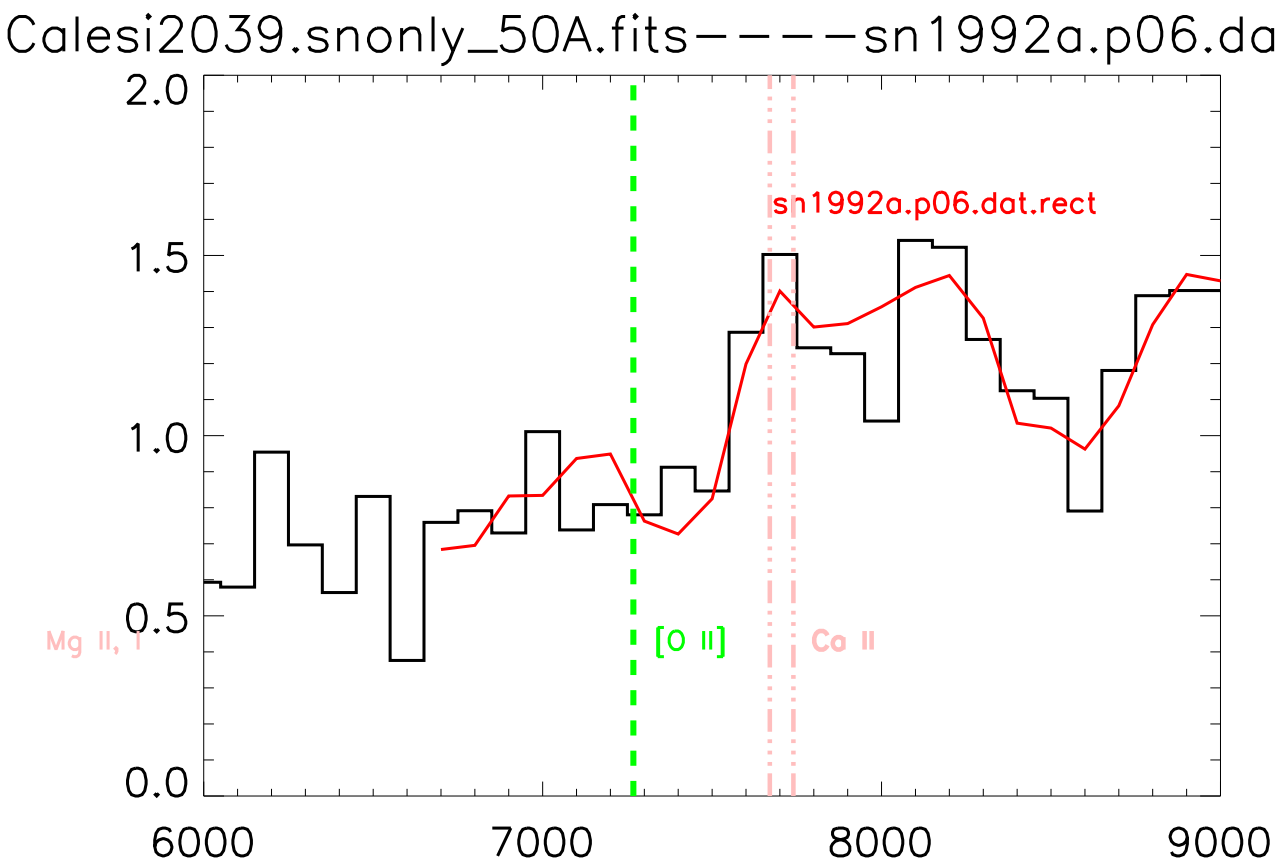
2
4
6
8
10
12
0.80
0.90
1.00
1.10


Calesi2039.snonly_50A.fits----sn1992a.p06.dat.rect
sn1992a.p06.dat.rect
Mg II, I
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Ca II
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0.5
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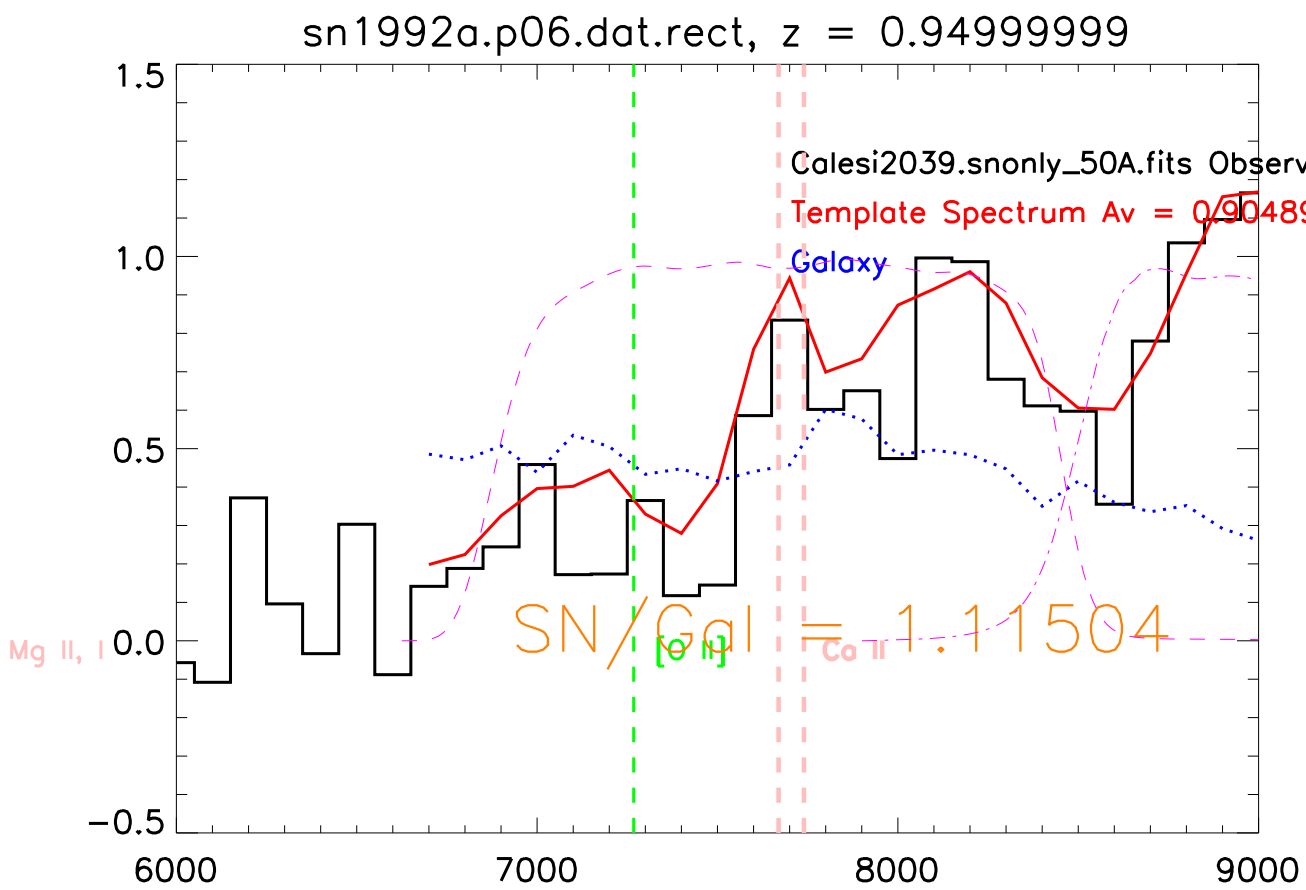
8000
9000


sn1992a.p06.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed – Gala
Template Spectrum Av = 0.90489060
Galaxy
SN/Gal = 1.11504
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Mg II, I
Ca II
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1.0
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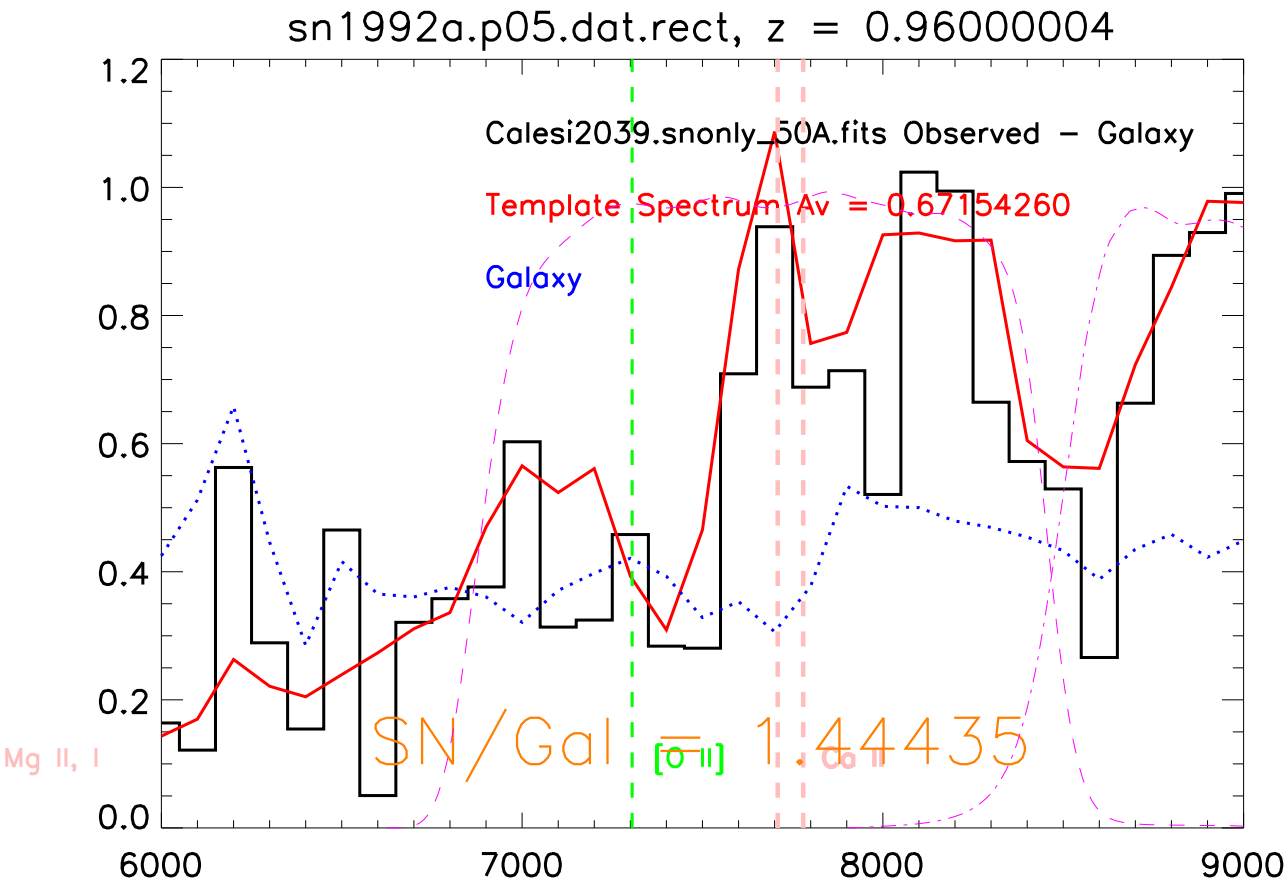
8000
9000


sn1992a.p05.dat.rect, z = 0.96000004
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 0.67154260
Galaxy
SN/Gal = 1.44435
[O II]
Mg II, I
Ca II
1.2
1.0
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0.4
0.2
0.0
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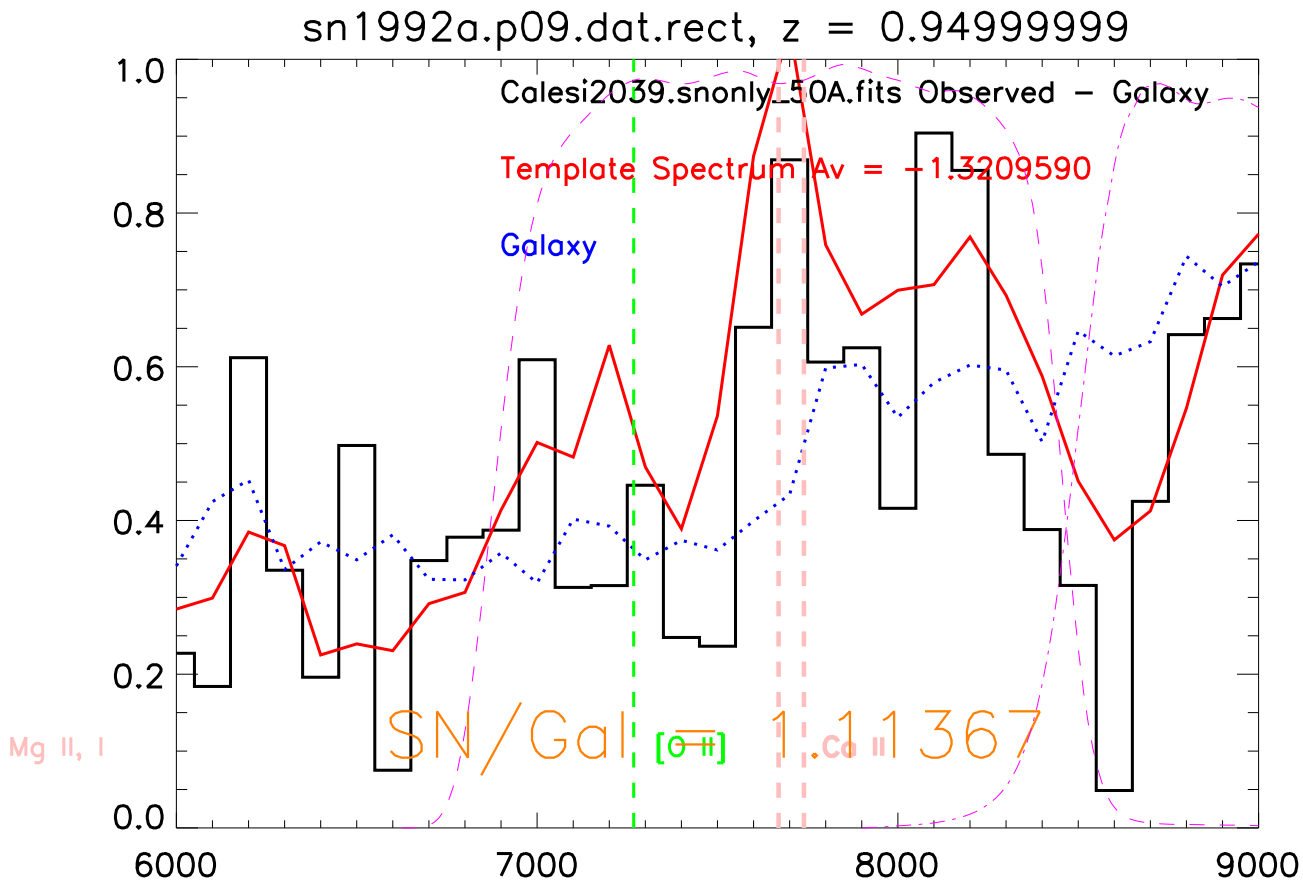
7000
8000
9000


sn1992a.p09.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = −1.3209590
Galaxy
SN/Gal = 1.11367
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Ca II
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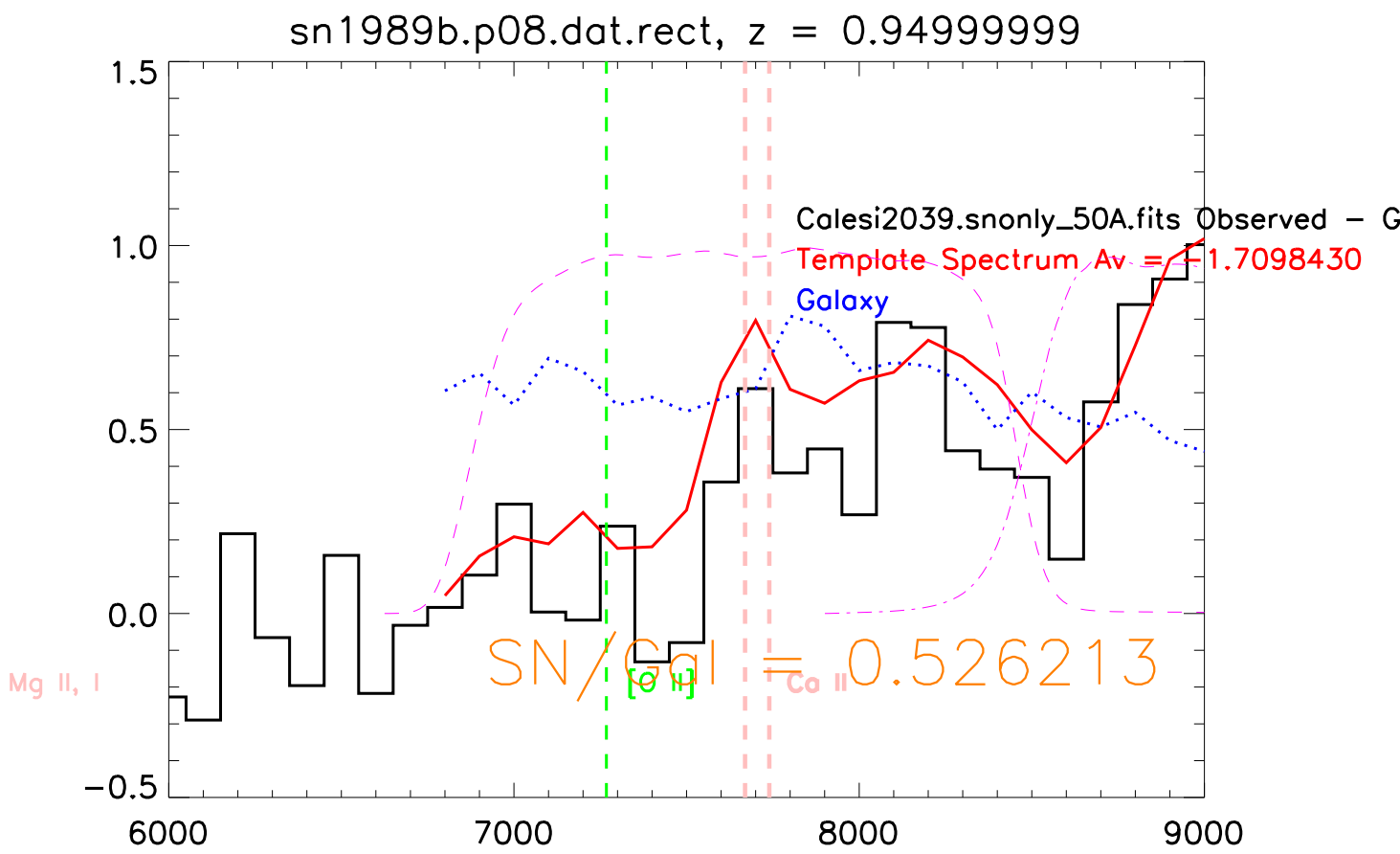
8000
9000


sn1989b.p08.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed – G
Template Spectrum Av = 1.7098430
Galaxy
SN/Gal = 0.526213
Mg II, I
[O II]
Ca II
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1.0
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0.0
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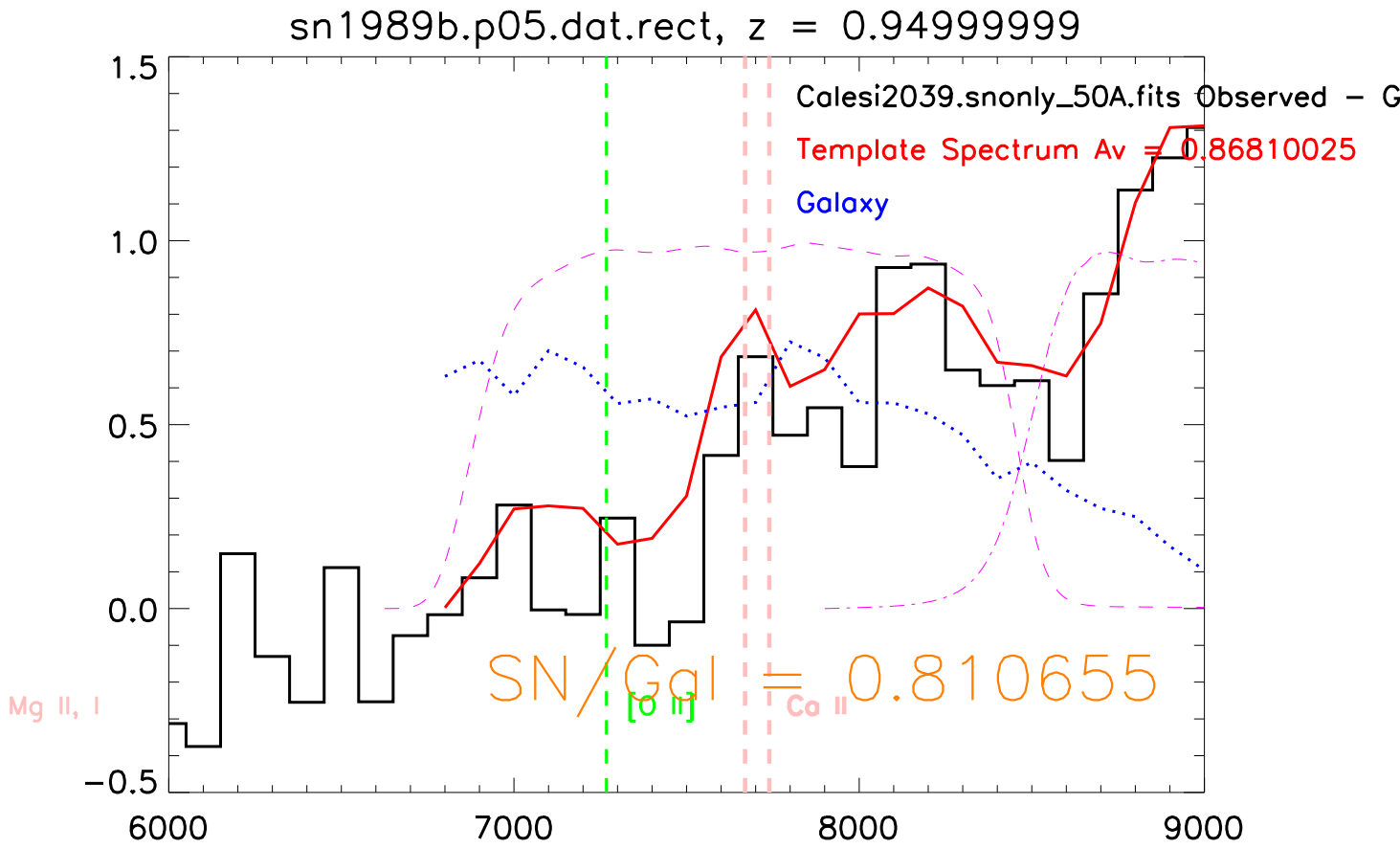
6000
7000
8000
9000


sn1989b.p05.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed – G
Template Spectrum Av = 0.86810025
Galaxy
SN/Gal = 0.810655
Mg II, I
[O II]
Ca II
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1.0
0.5
0.0
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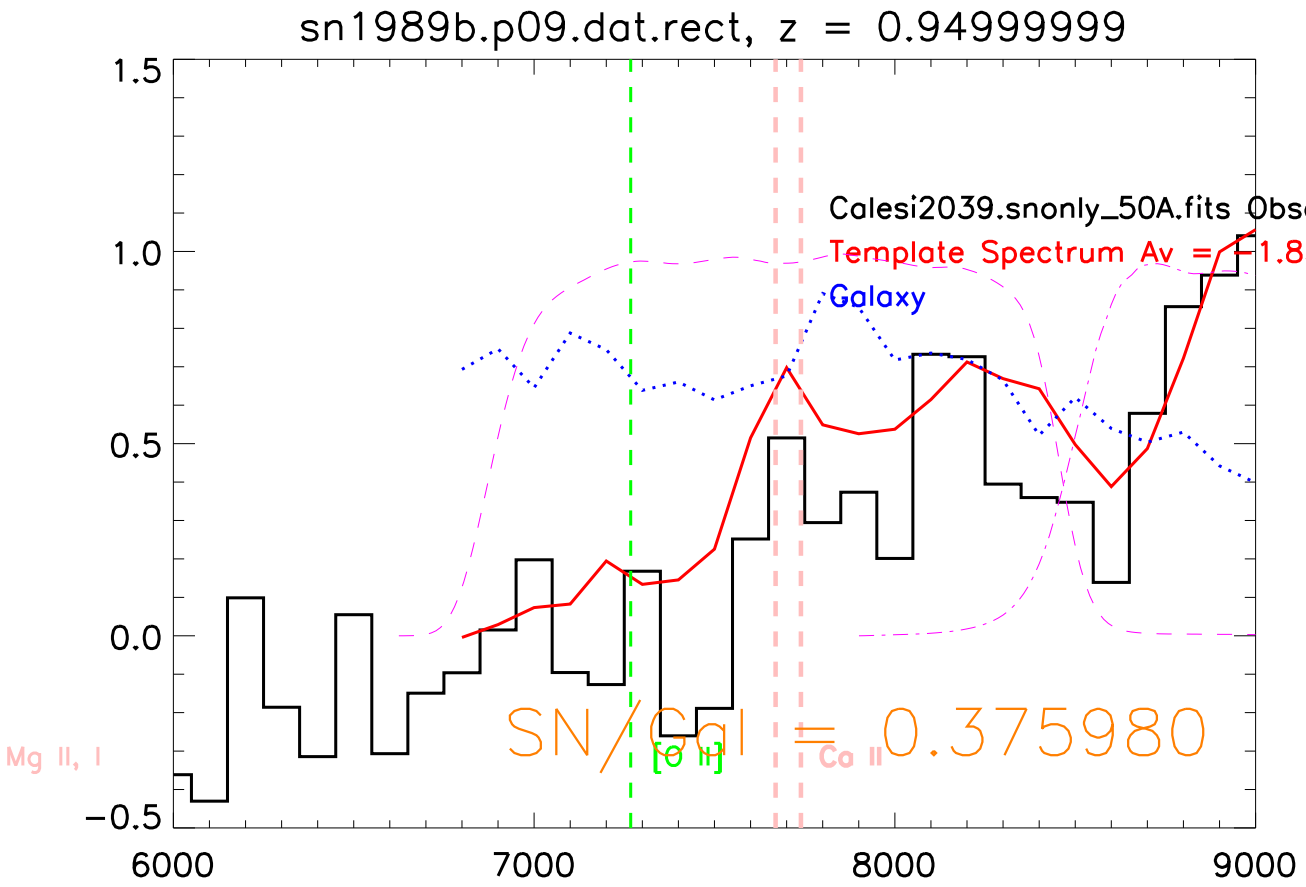
8000
9000


sn1989b.p09.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed – G
Template Spectrum Av = 1.8327817
Galaxy
SN/Gal = 0.375980
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Ca II
Mg II, I
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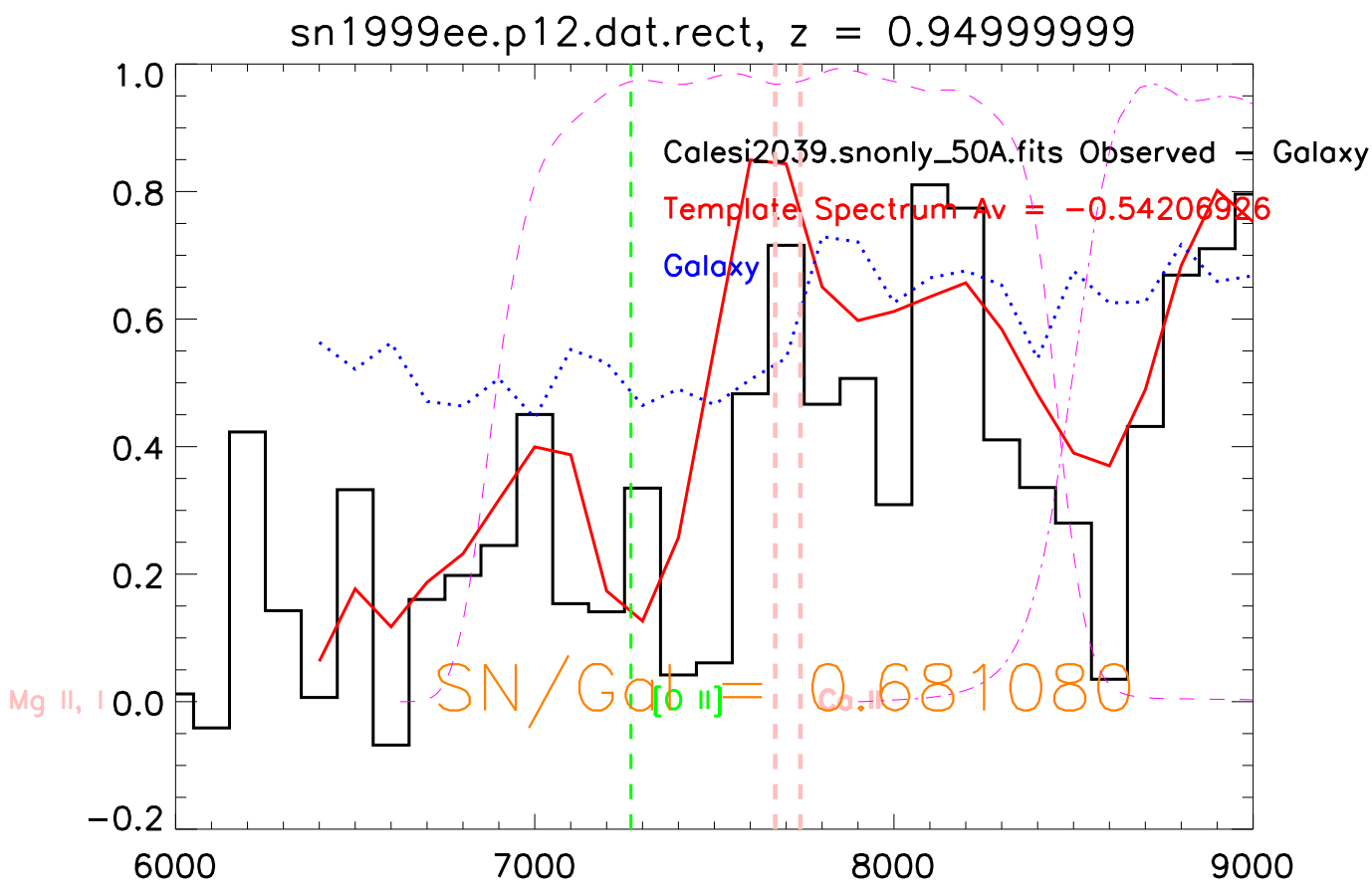
1.0
0.5
0.0
−0.5
6000
7000
8000
9000


sn1999ee.p12.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = −0.54206926
Galaxy
SN/Gal = 0.681080
[O II]
Mg II, I
Ca II
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0.8
0.6
0.4
0.2
0.0
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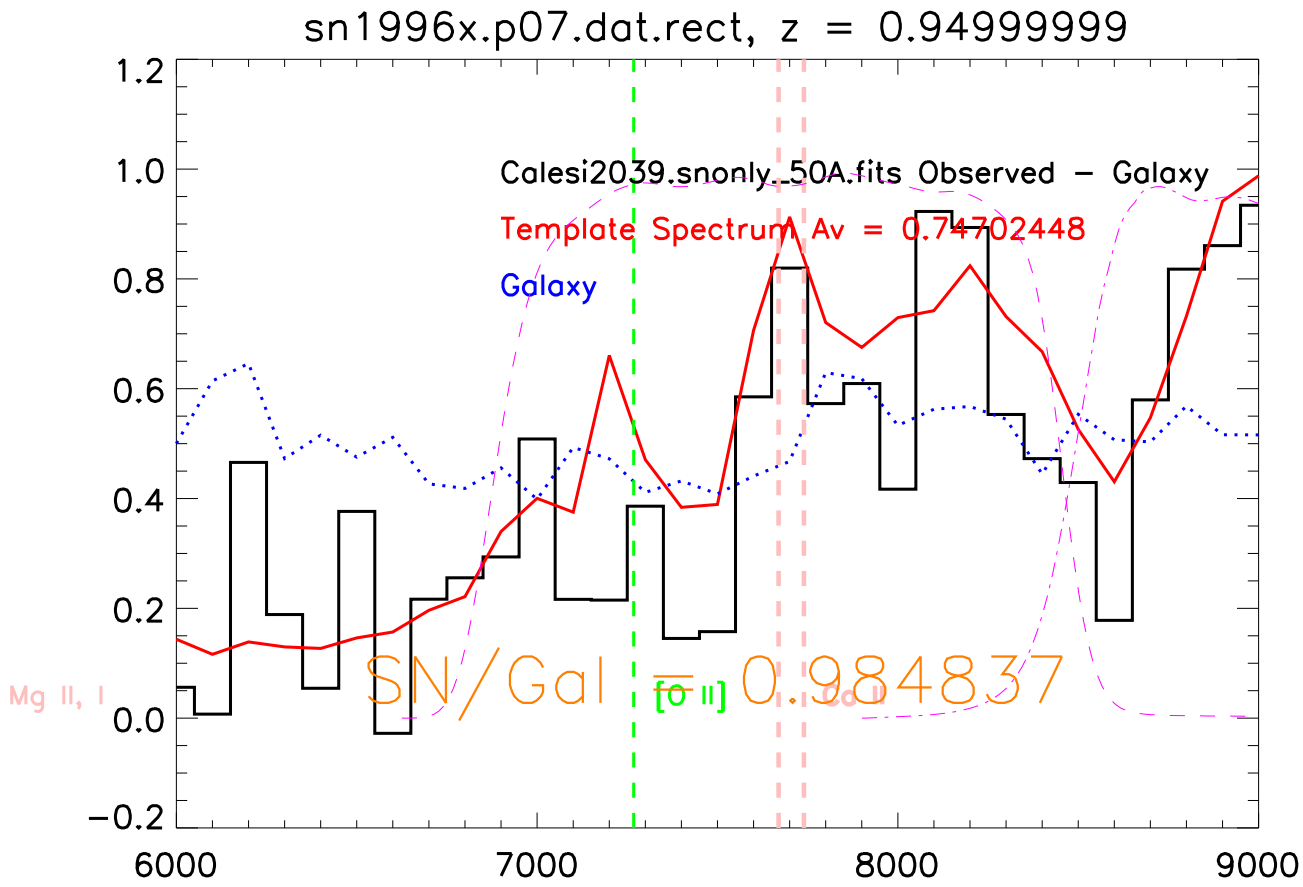
7000
8000
9000


sn1996x.p07.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 0.74702448
Galaxy
SN/Gal = 0.984837
[O II]
Mg II, I
Ca II
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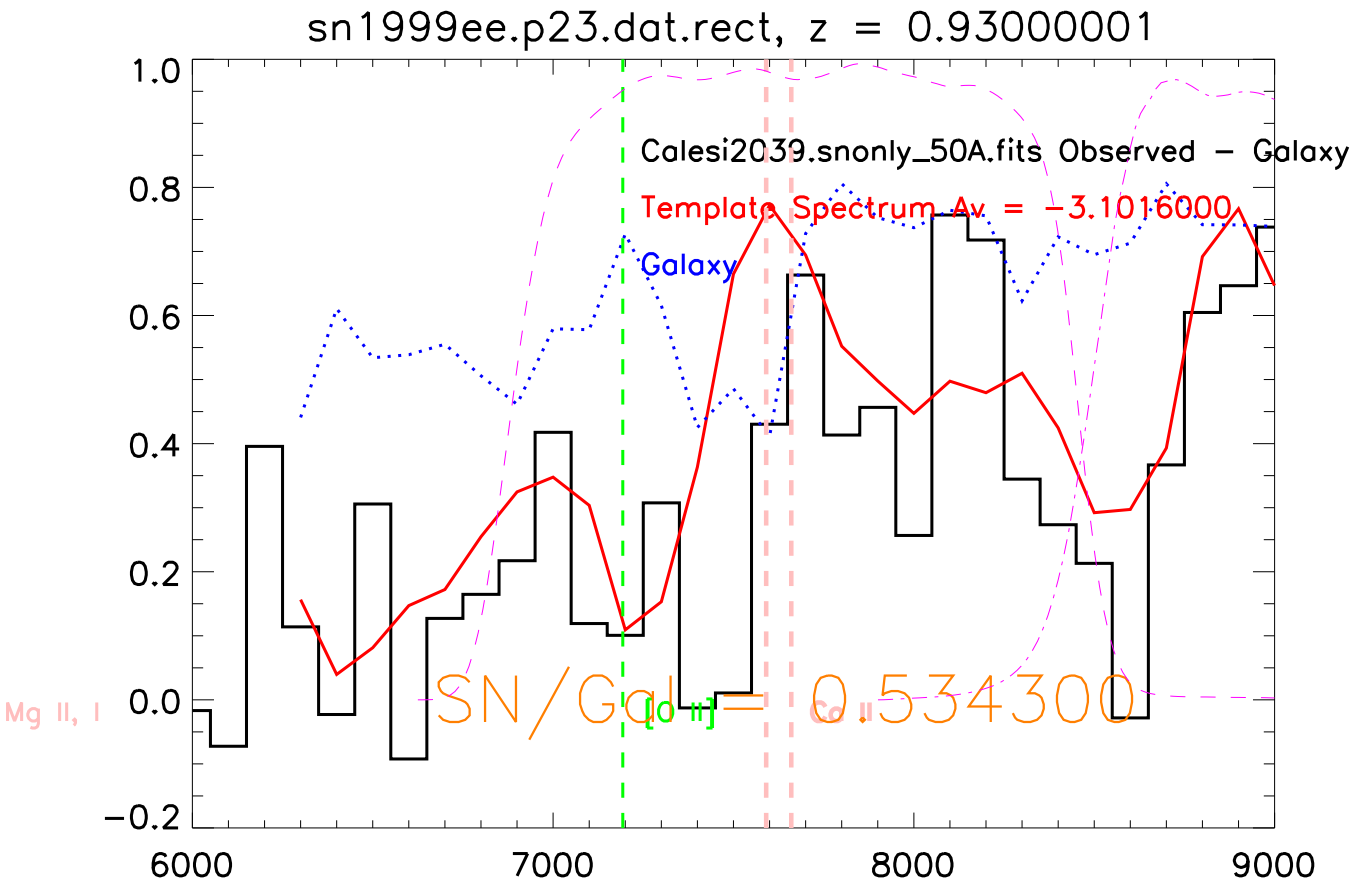
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000


sn1999ee.p23.dat.rect, z = 0.93000001
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = −3.101600
Galaxy
SN/Gal = 0.534300
Mg II, I
[O II]
Ca II
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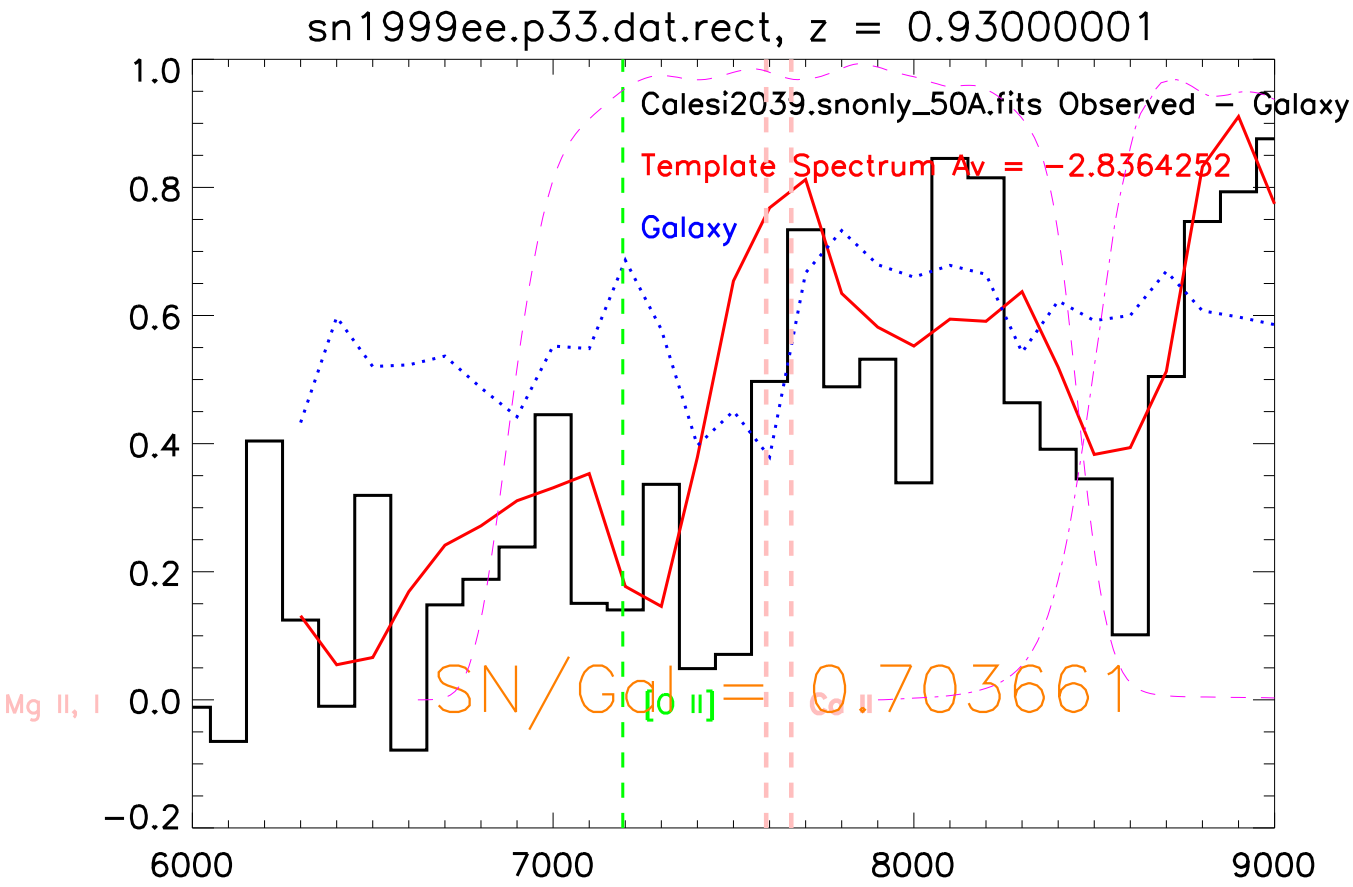
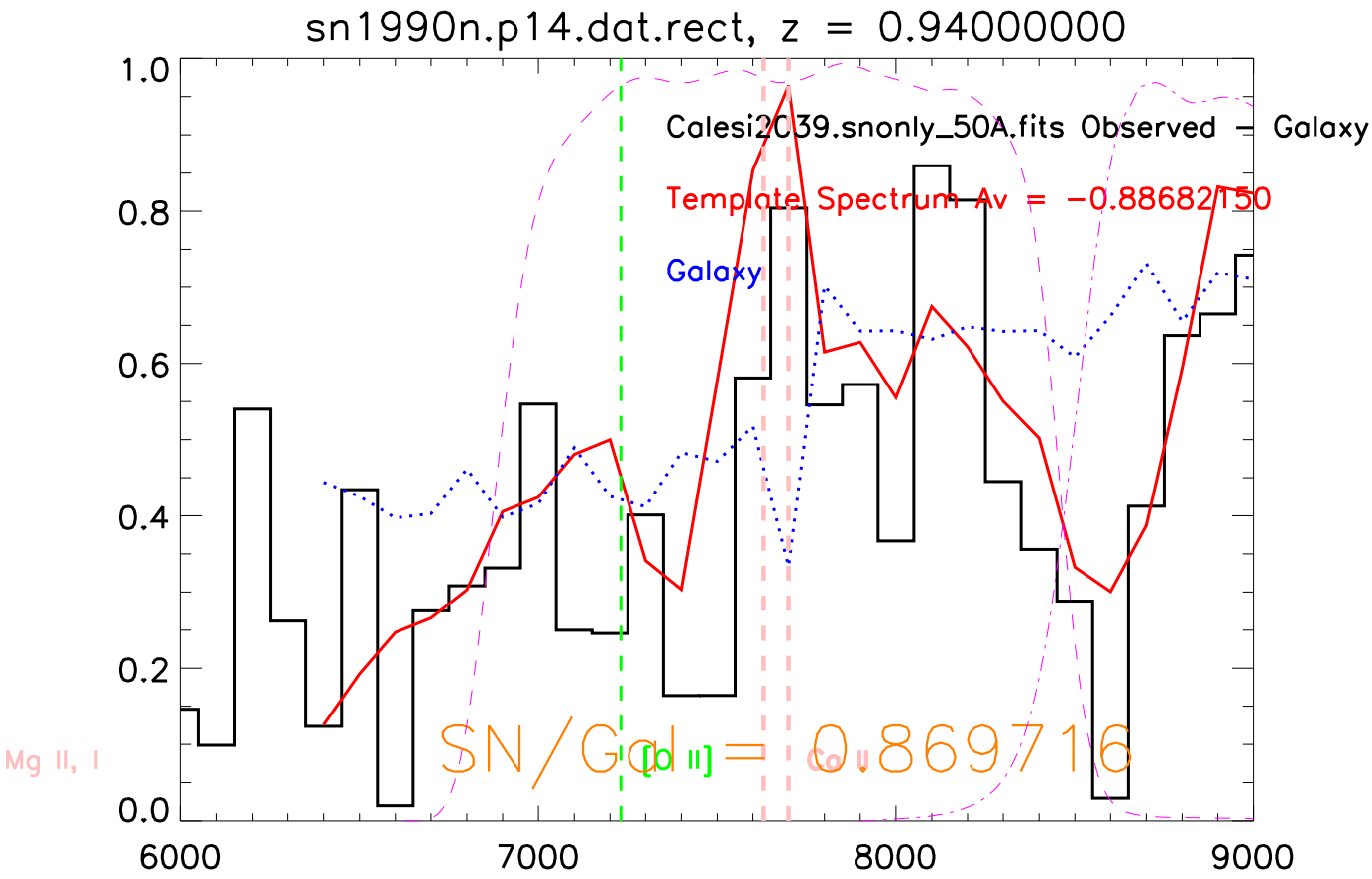
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000


sn1999ee.p33.dat.rect, z = 0.93000001
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = –2.8364252
Galaxy
SN/Gal = 0.703661
Mg II, I
[O II]
Ca II
1.0
0.8
0.6
0.4
0.2
0.0
–0.2
6000
7000
8000
9000


sn1990n.p14.dat.rect, z = 0.94000000
Calesi2C39.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = -0.88682150
Galaxy
SN/Gal = 0.869716
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Mg II, I
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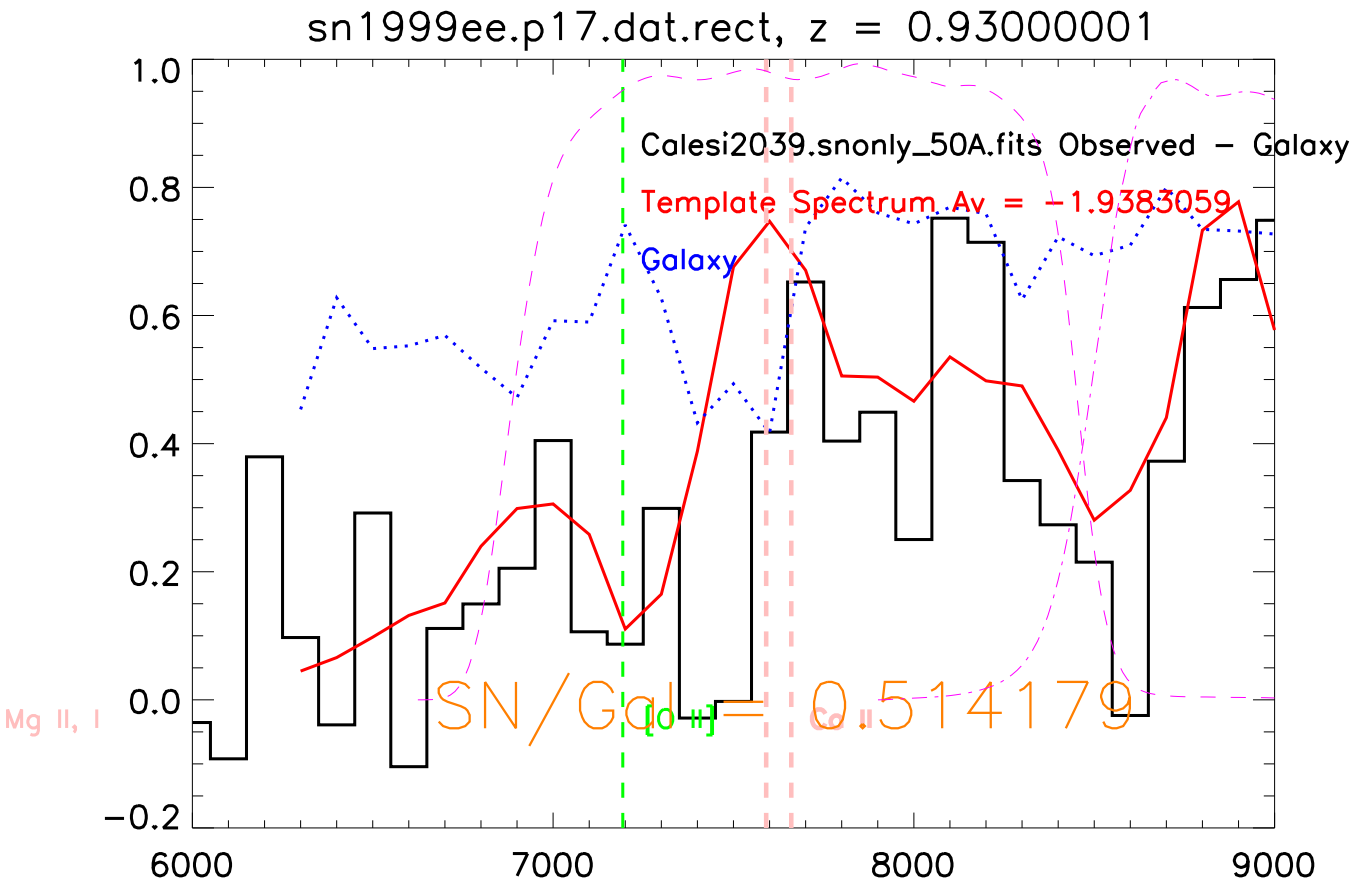
0.6
0.4
0.2
0.0
6000
7000
8000
9000


sn1999ee.p17.dat.rect, z = 0.93000001
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = −1.9383059
Galaxy
SN/Gal = 0.514179
Mg II, I
[O II]
Ca II
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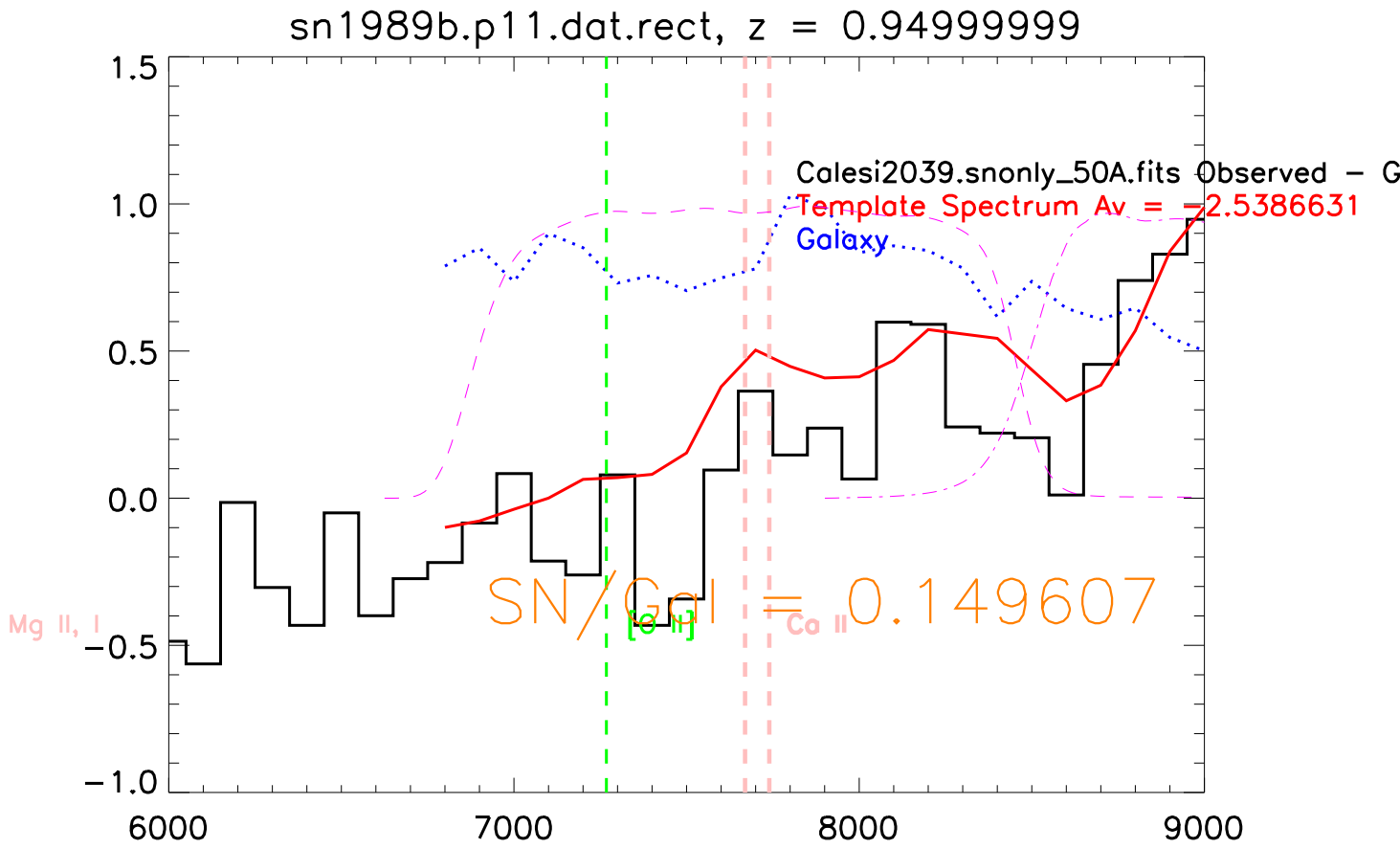
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000


sn1989b.p11.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed – G
Template Spectrum Av = 2.5386631
Galaxy
SN/Gal = 0.149607
Mg II, I
[O II]
Ca II
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1.0
0.5
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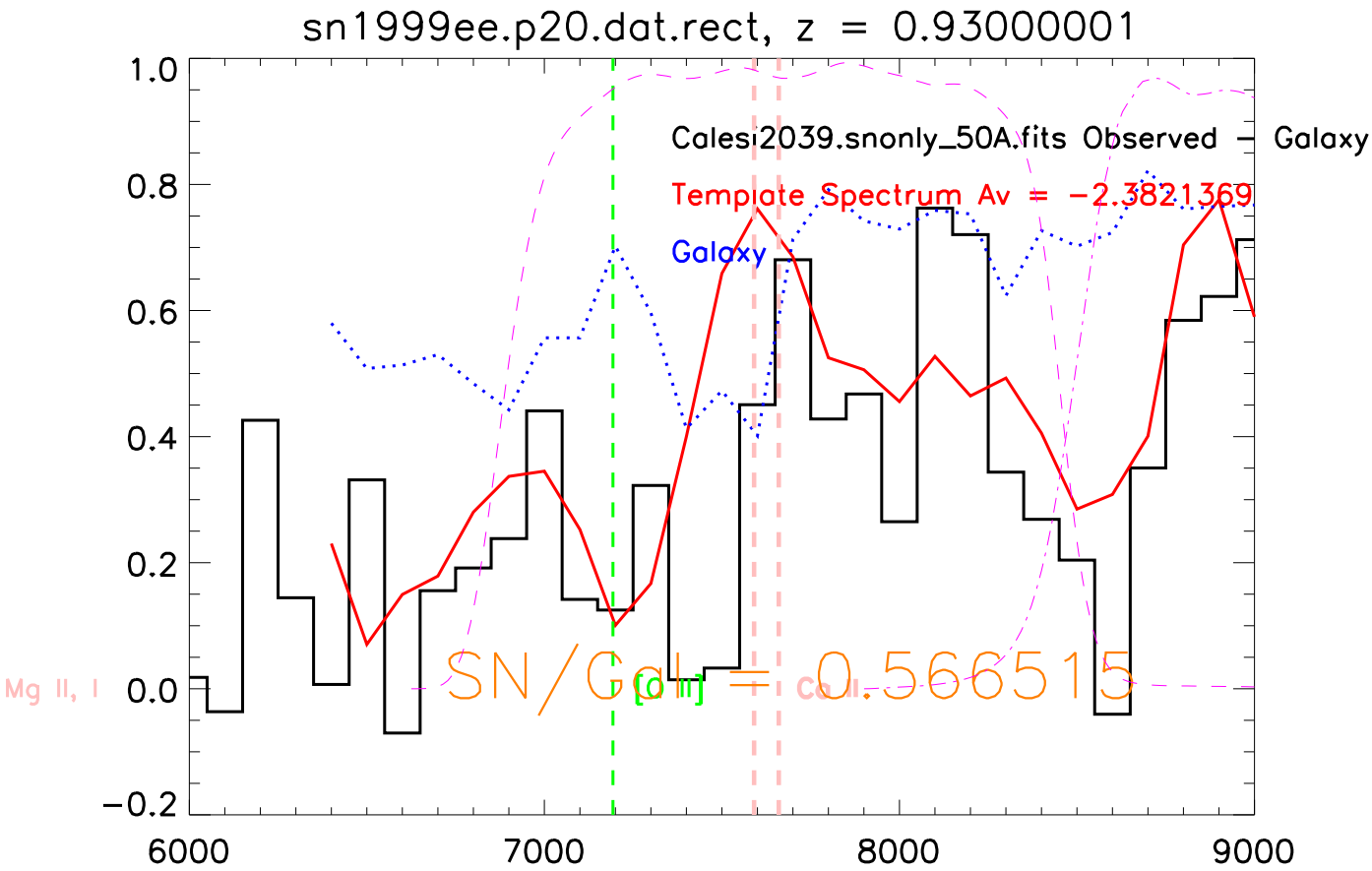
−1.0
6000
7000
8000
9000


sn1999ee.p20.dat.rect, z = 0.93000001
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = −2.3821369
Galaxy
SN/Gal = 0.566515
[O II]
Mg II, I
Ca II
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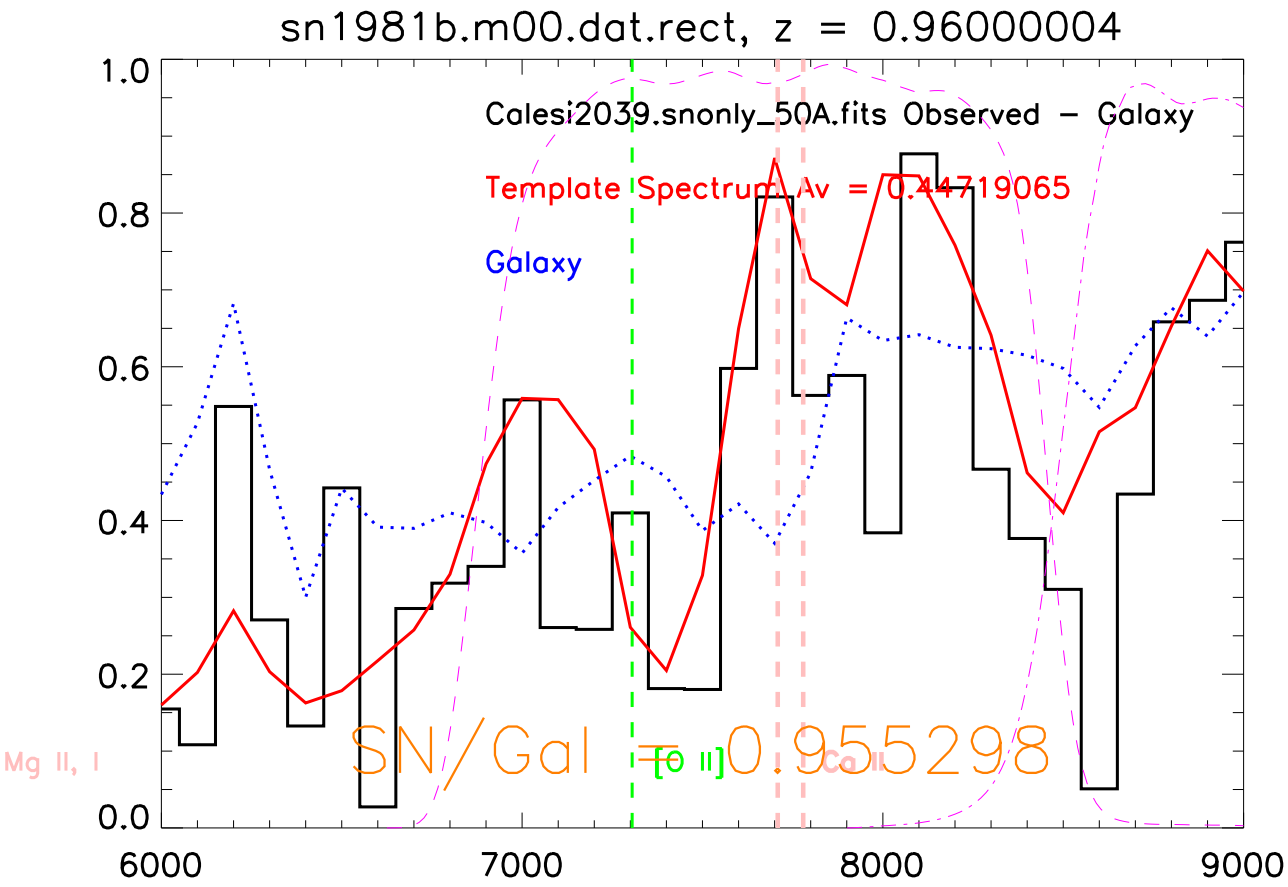
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000


sn1981b.m00.dat.rect, z = 0.96000004
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum, Av = 0.44719065
Galaxy
SN/Gal = 0.955298
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Mg II, I
Ca II
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0.6
0.4
0.2
0.0
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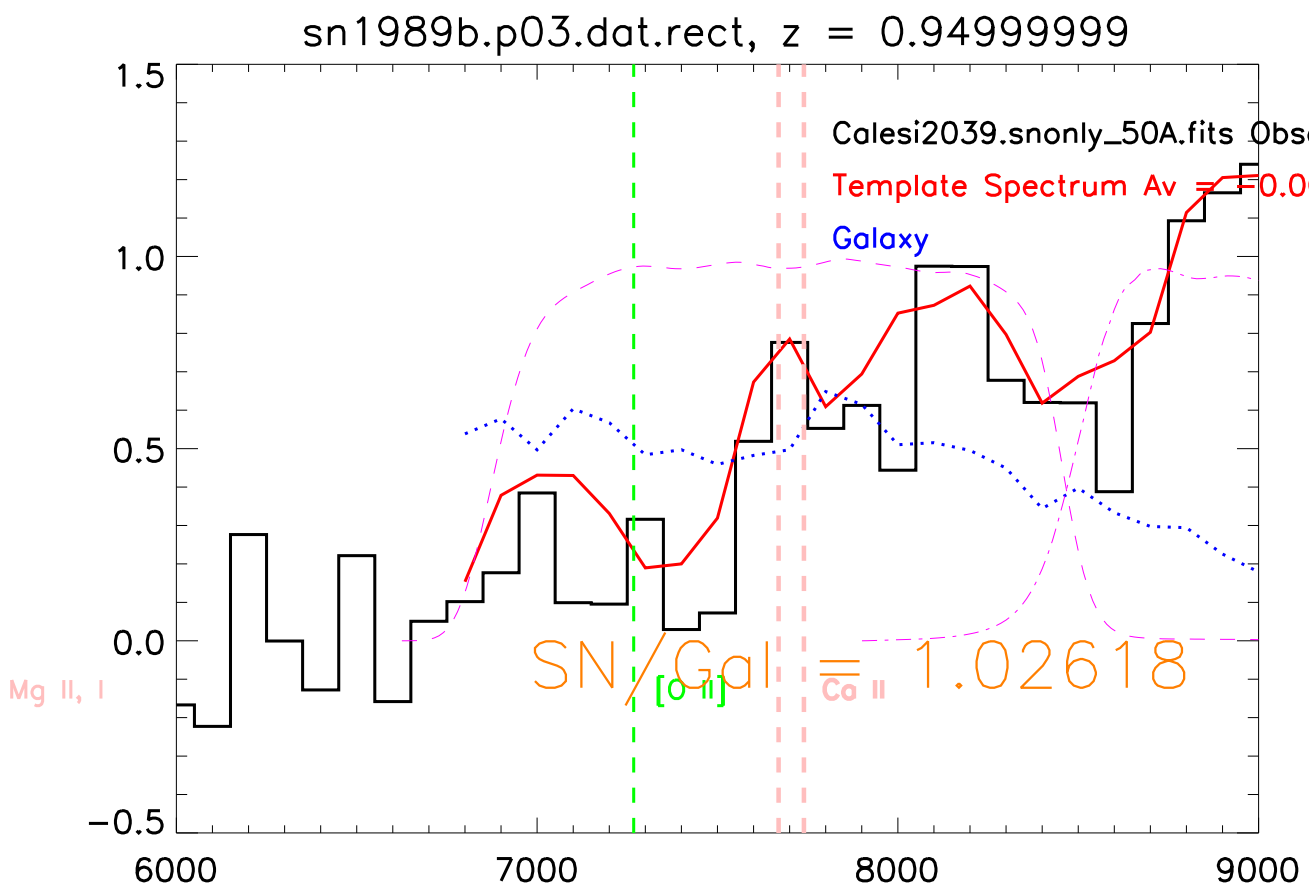
7000
8000
9000


sn1989b.p03.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed – G
Template Spectrum Av = 0.009552203
Galaxy
SN/Gal = 1.02618
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Ca II
Mg II, I
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1.0
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0.0
−0.5
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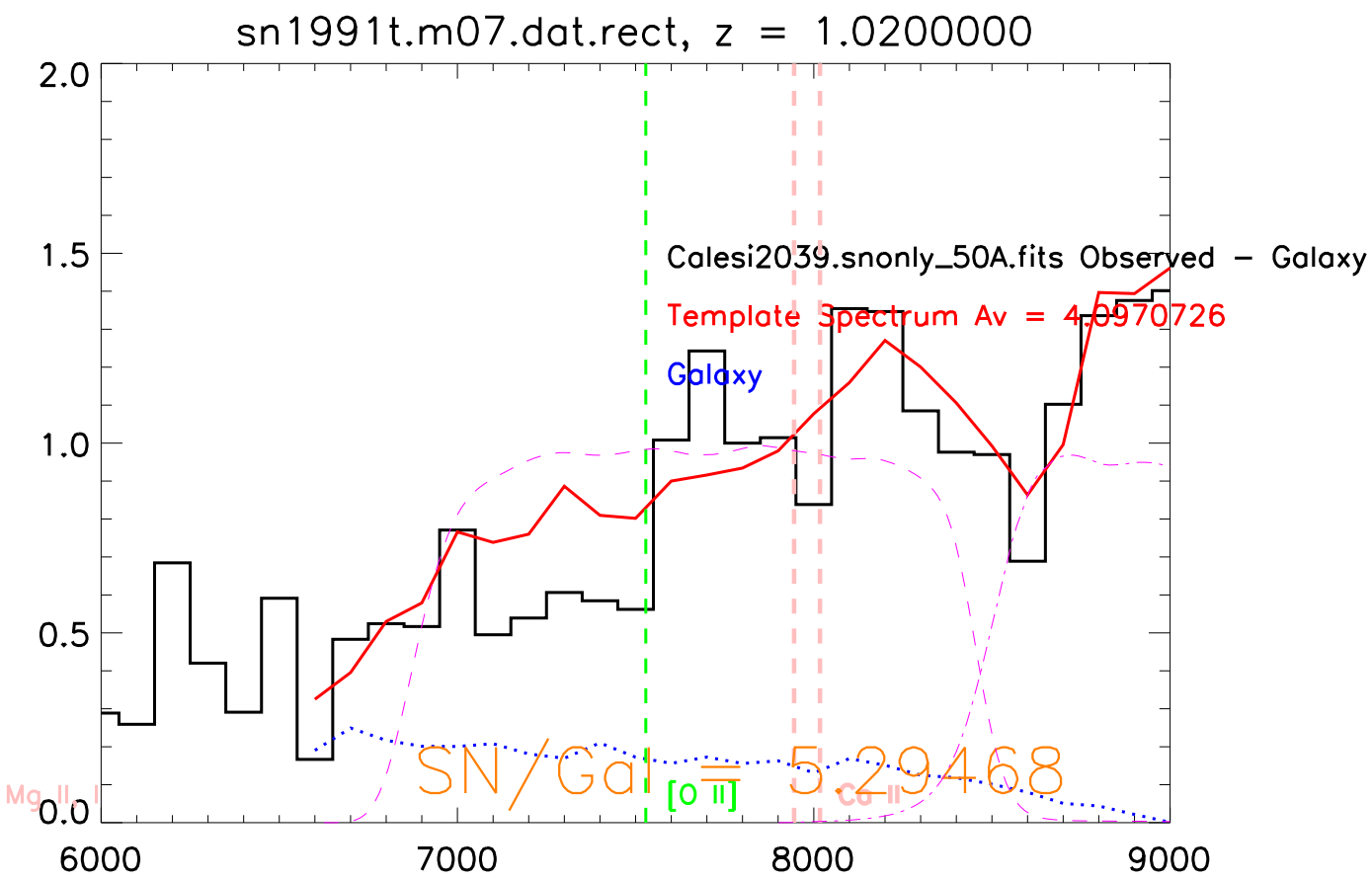
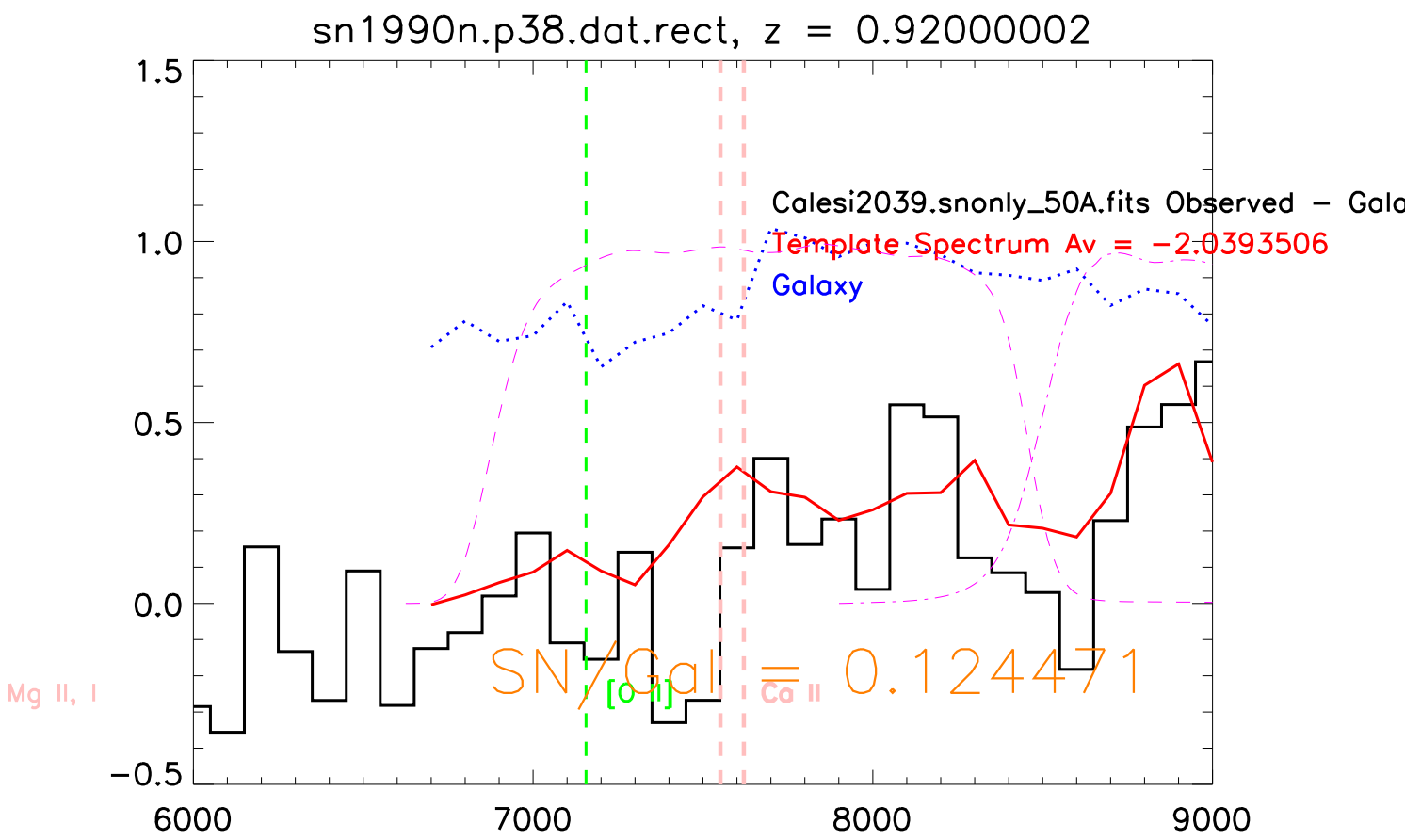
7000
8000
9000


sn1991t.m07.dat.rect, z = 1.0200000
2.0
1.5
1.0
0.5
0.0
6000
7000
8000
9000
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 4.0970726
Galaxy
SN/Gal = 5.29468
[O II]
Ca II
Mg II


sn1990n.p38.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed – Gala
Template Spectrum Av = −2.0393506
Galaxy
SN/Gal = 0.124471
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Ca II
Mg II, I
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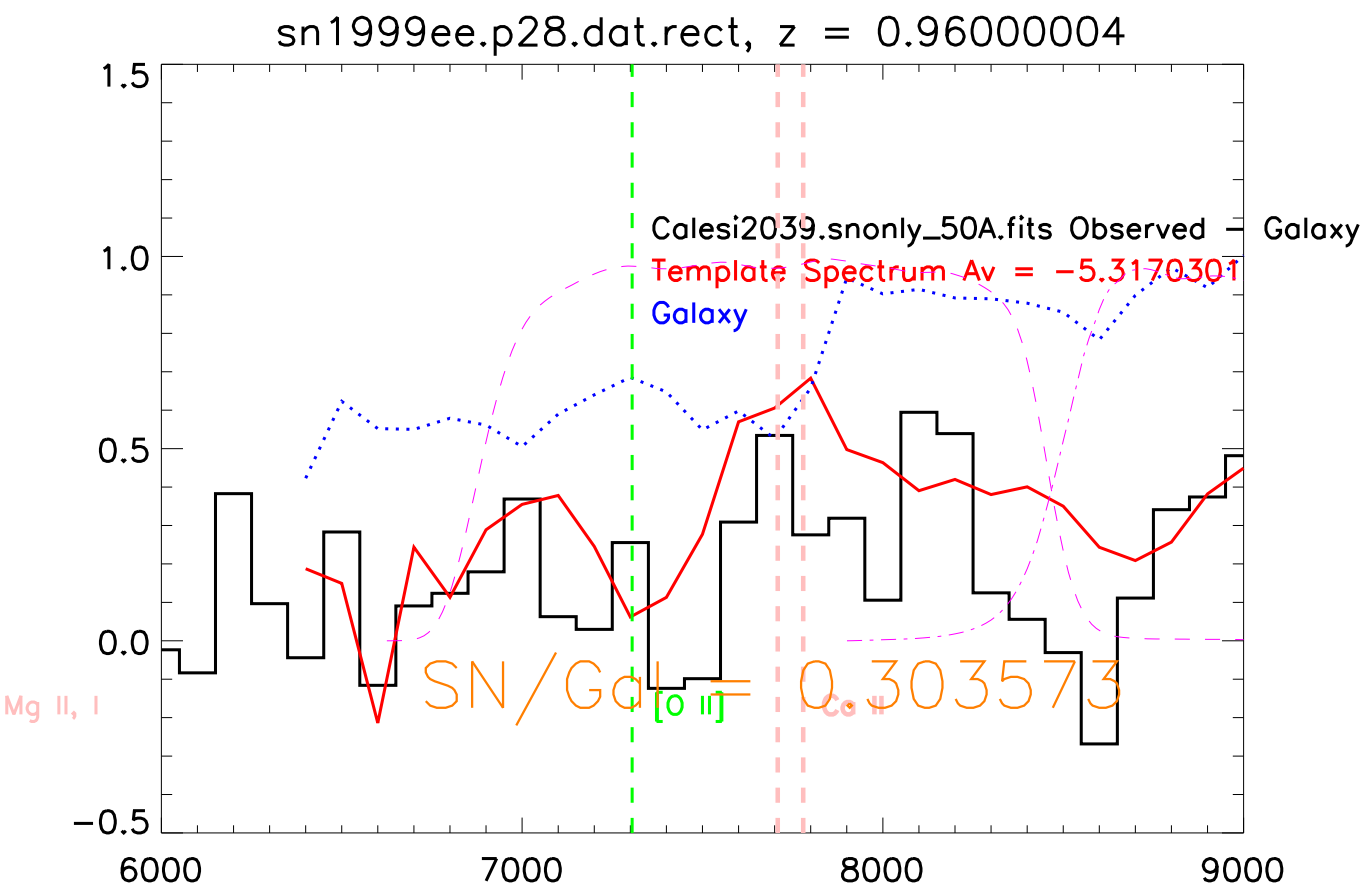
1.0
0.5
0.0
−0.5
6000
7000
8000
9000


sn1999ee.p28.dat.rect, z = 0.96000004
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = -5.3170301
Galaxy
SN/Gal = 0.303573
Mg II, I
[O II]
Ca II
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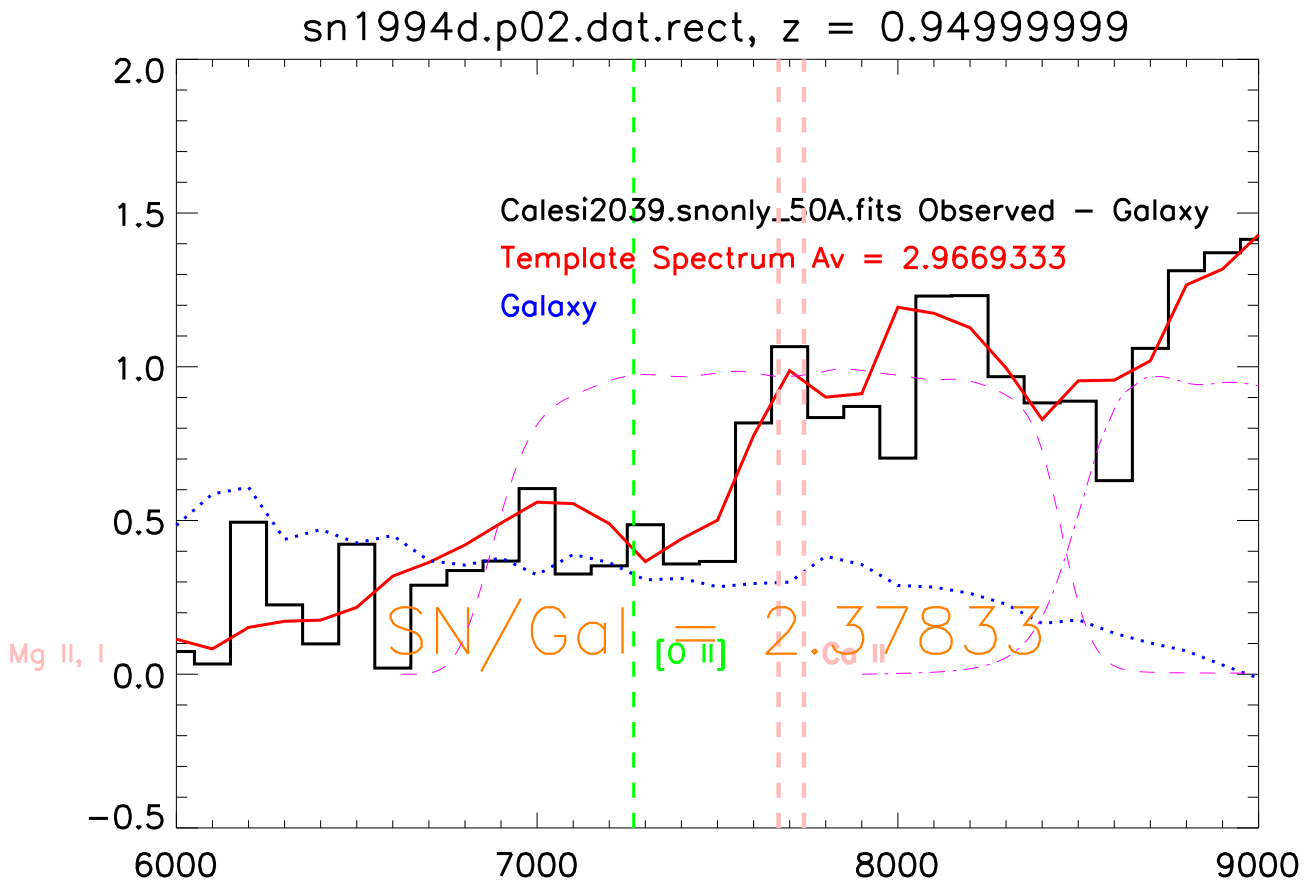
1.0
0.5
0.0
-0.5
6000
7000
8000
9000


sn1994d.p02.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 2.9669333
Galaxy
SN/Gal = 2.37833
[O II]
Mg II, I
Ca II
2.0
1.5
1.0
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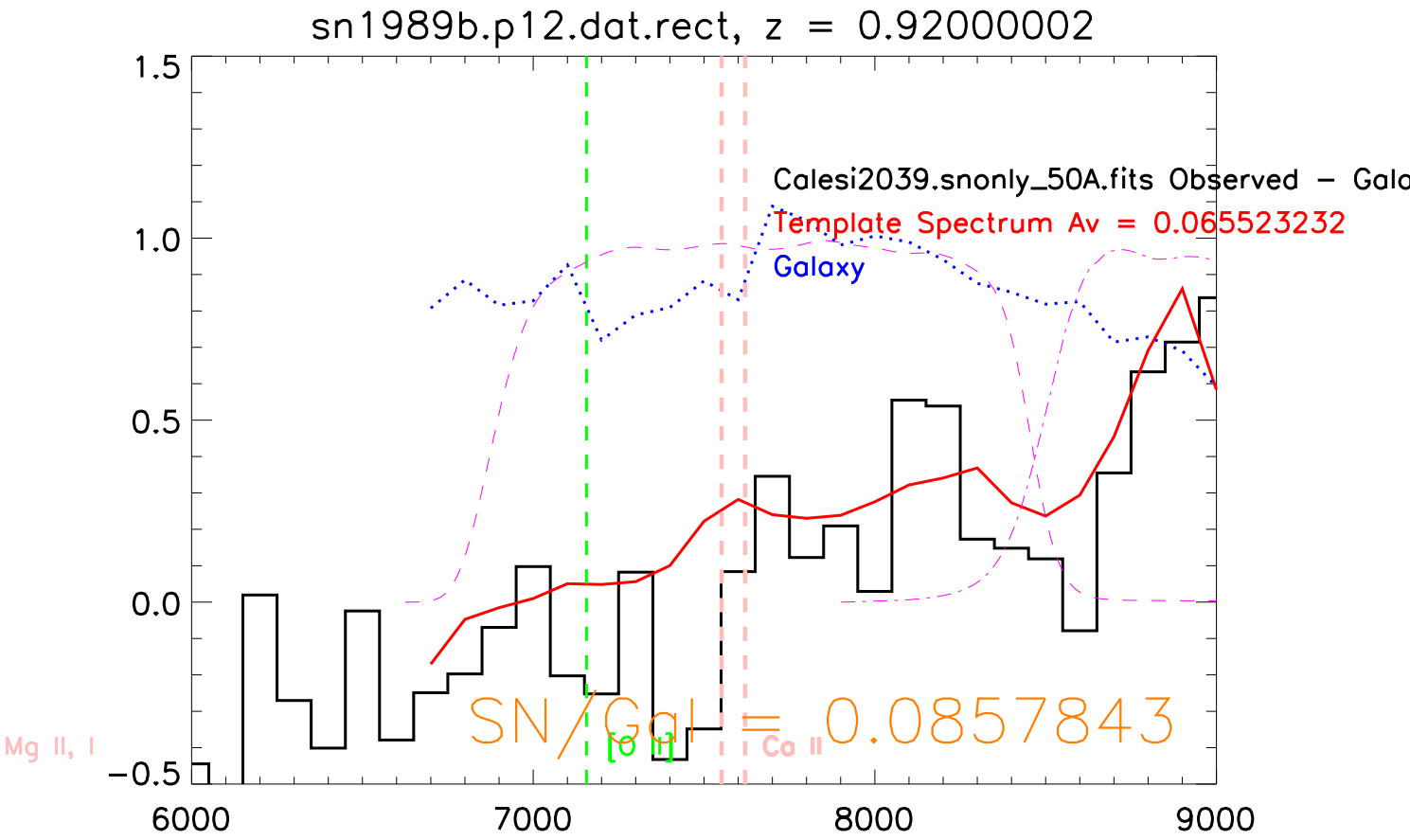
0.0
−0.5
6000
7000
8000
9000


sn1989b.p12.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed – Gala
Template Spectrum Av = 0.065523232
Galaxy
SN/Gal = 0.0857843
Mg II, I
[O II]
Ca II
1.5
1.0
0.5
0.0
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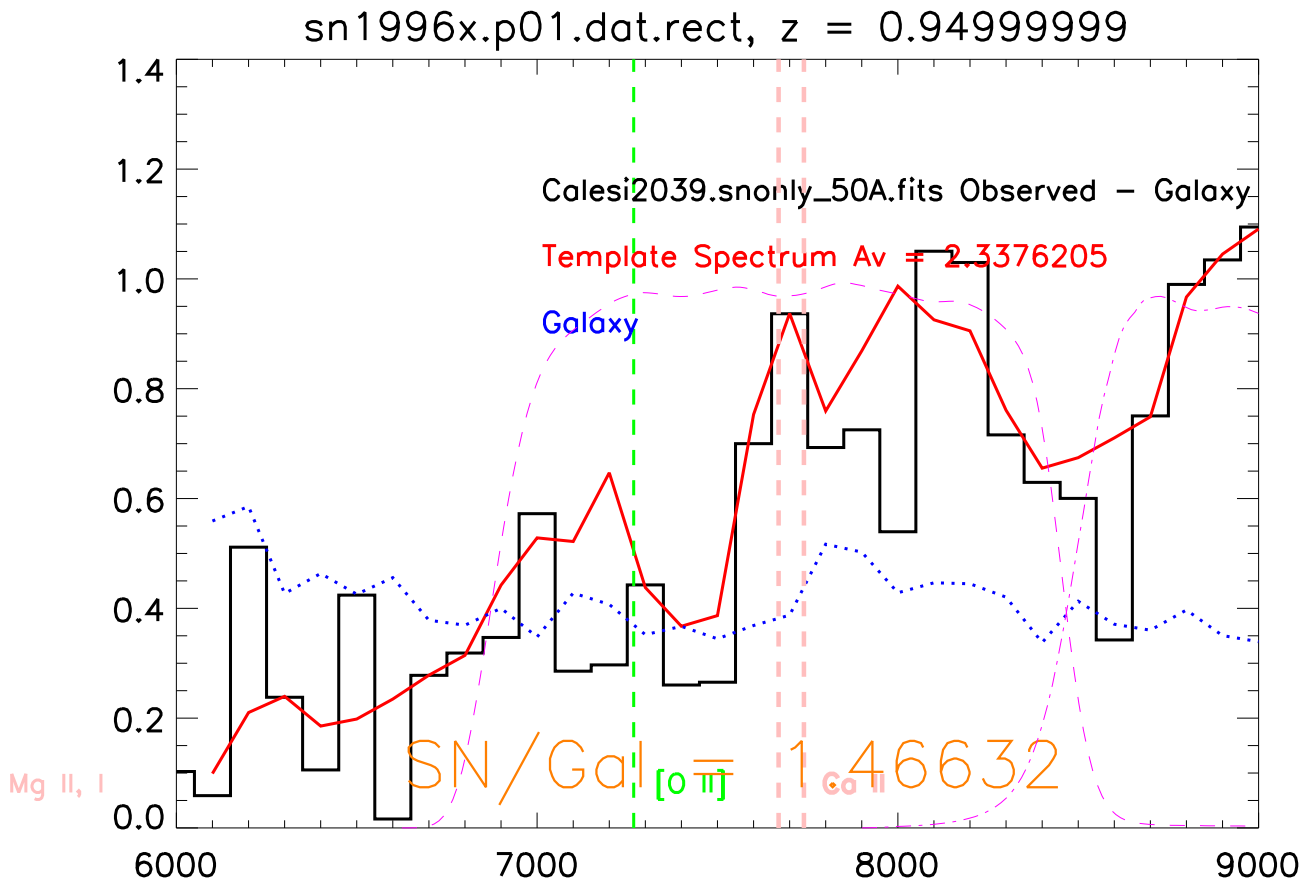
7000
8000
9000


sn1996x.p01.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 2.3376205
Galaxy
SN/Gal = 1.46632
[O II]
Ca II
Mg II, I
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1.2
1.0
0.8
0.6
0.4
0.2
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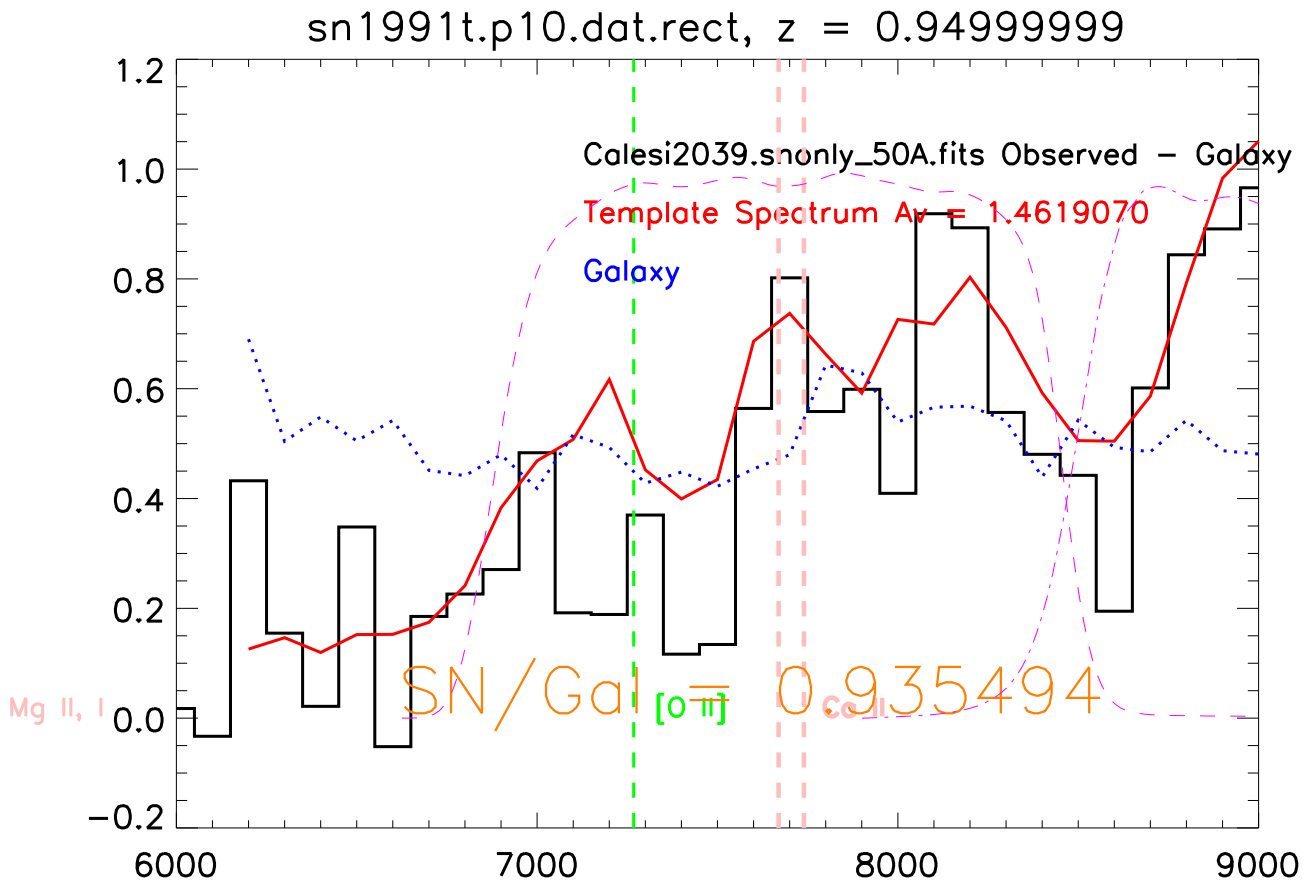
7000
8000
9000


sn1991t.p10.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = 1.4619070
Galaxy
SN/Gal = 0.935494
[O II]
Mg II, I
Ca II
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1.0
0.8
0.6
0.4
0.2
0.0
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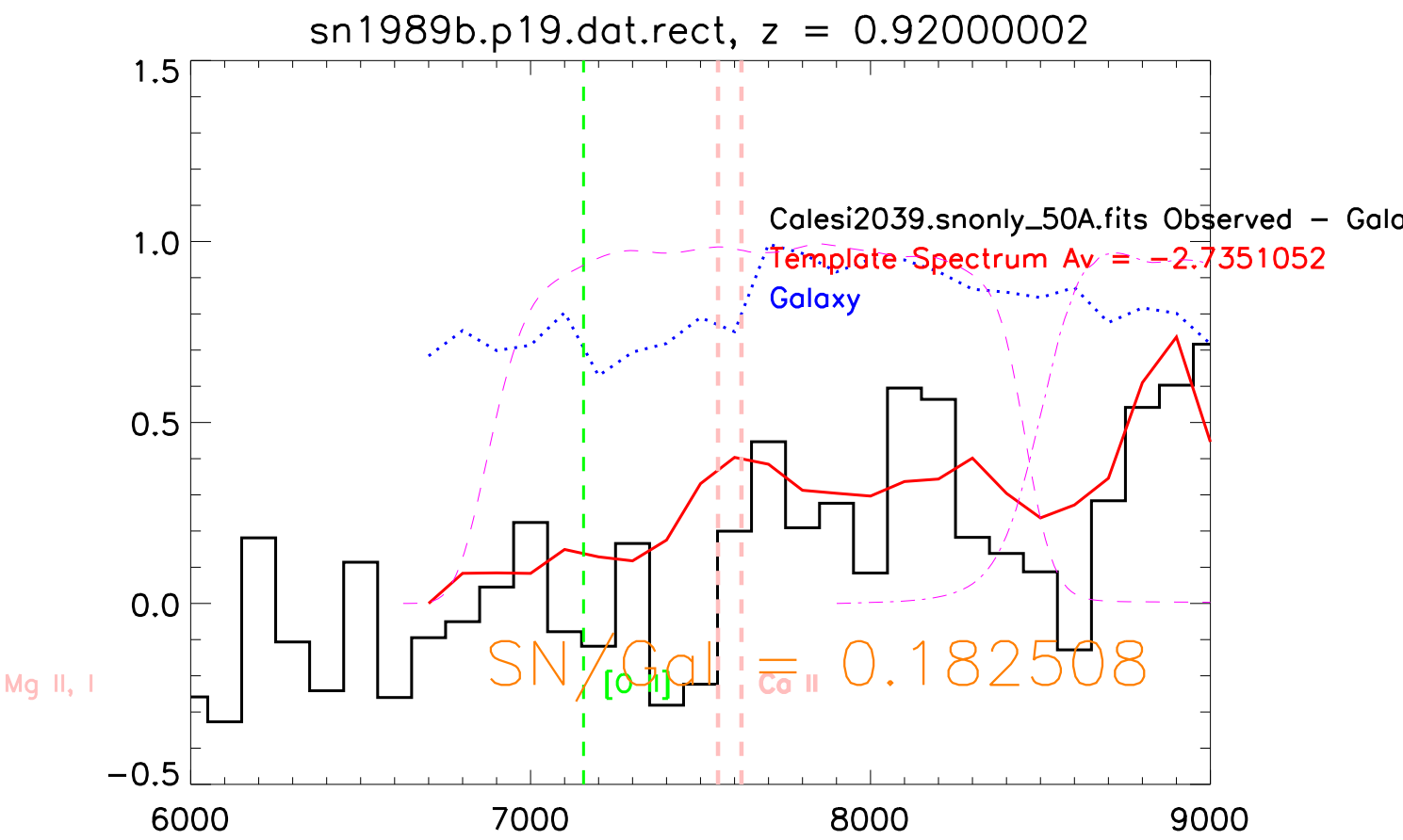
7000
8000
9000


sn1989b.p19.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed – Gala
Template Spectrum Av = −2.7351052
Galaxy
SN/Gal = 0.182508
Mg II, I
[O II]
Ca II
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1.0
0.5
0.0
−0.5
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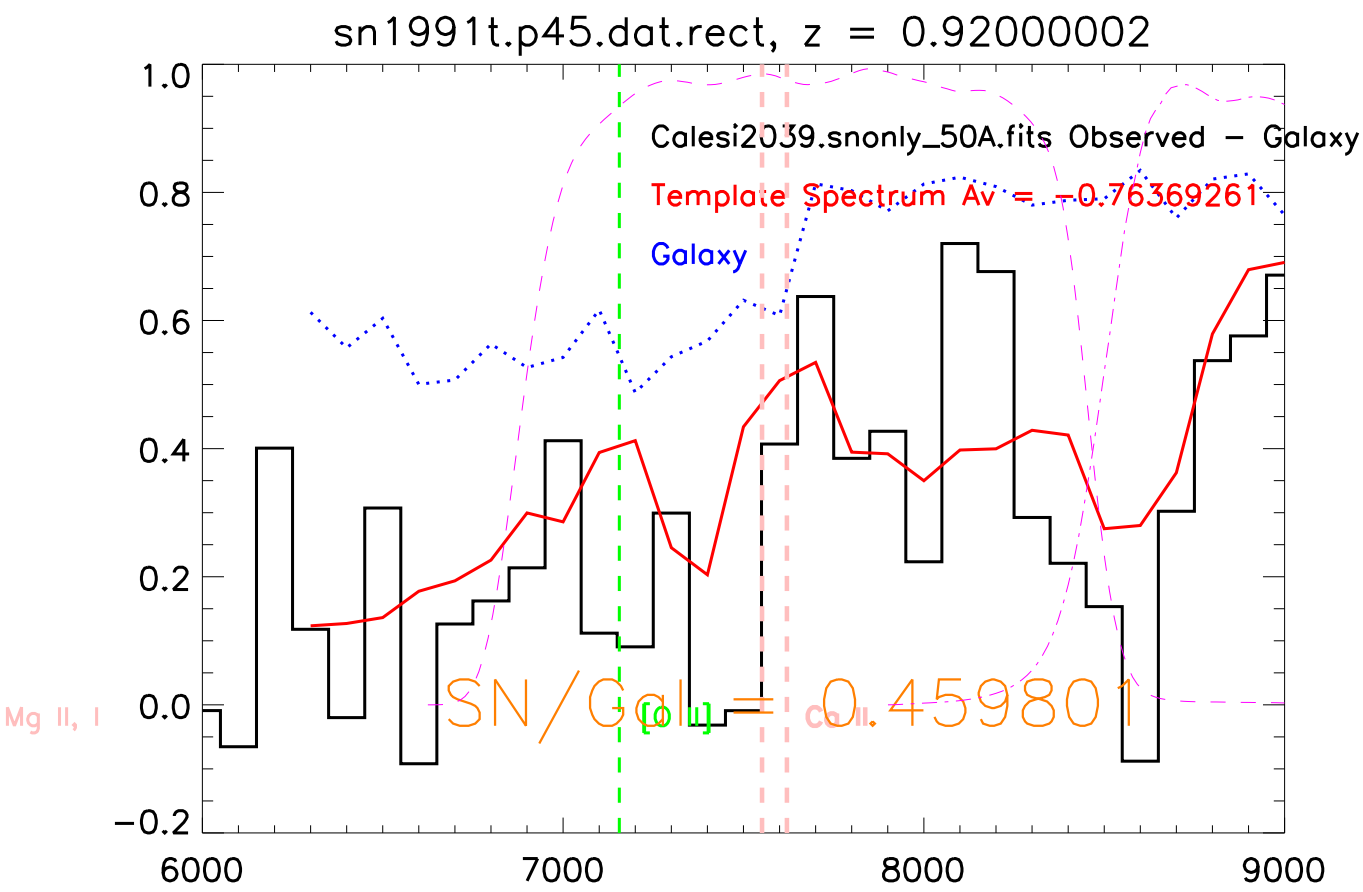
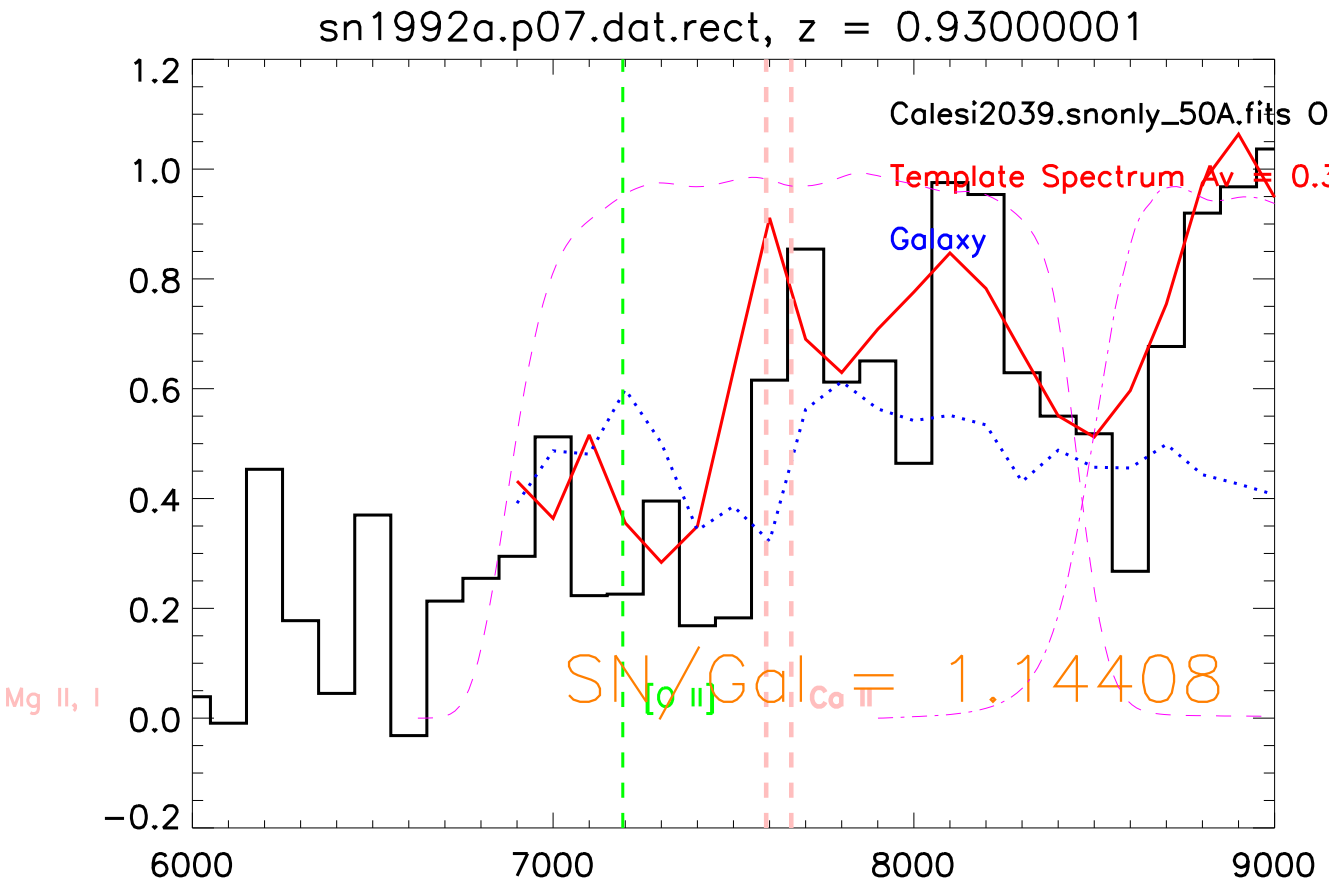
7000
8000
9000


sn1991t.p45.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = −0.76369261
Galaxy
SN/Gal = 0.459801
Mg II, I
[O II]
Ca II
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000


sn1992a.p07.dat.rect, z = 0.93000001
Calesi2039.snonly_50A.fits Observed -
Template Spectrum Av = 0.35936809
Galaxy
SN/Gal = 1.14408
[O II]
Ca II
Mg II, I
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1.0
0.8
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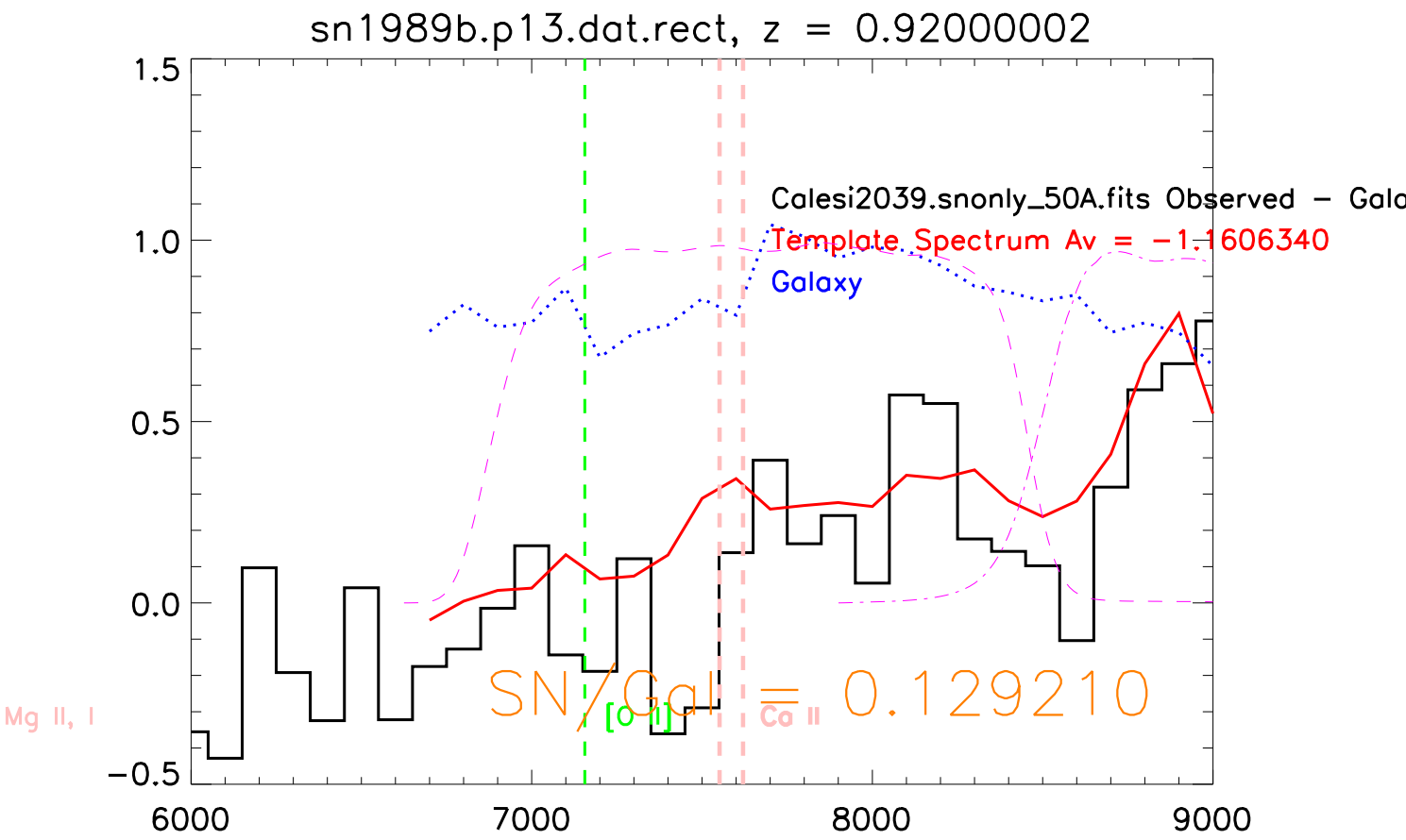
sn1989b.p13.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed – Galo
Template Spectrum Av = −1.1606340
Galaxy
SN/Gal = 0.129210
[O II]
Ca II
Mg II, I
1.5
1.0
0.5
0.0
−0.5
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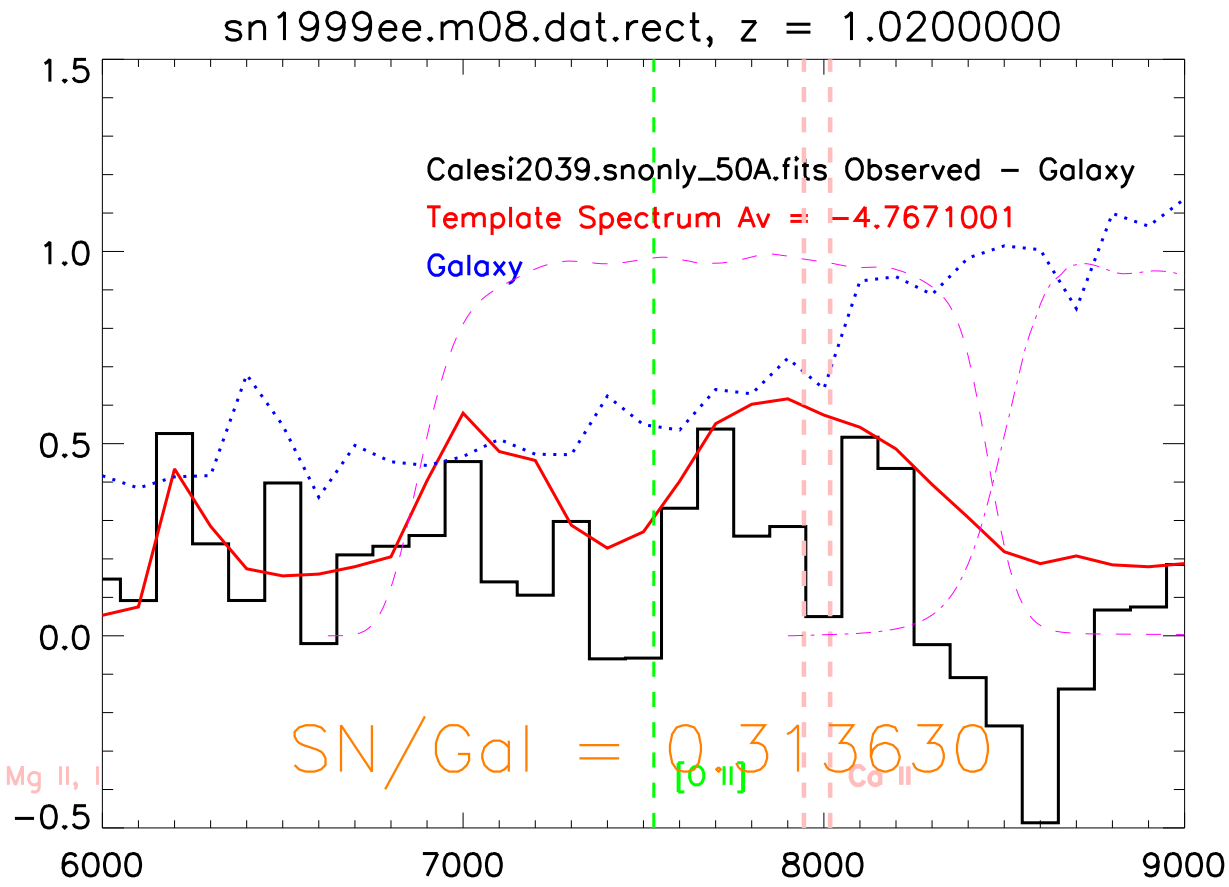
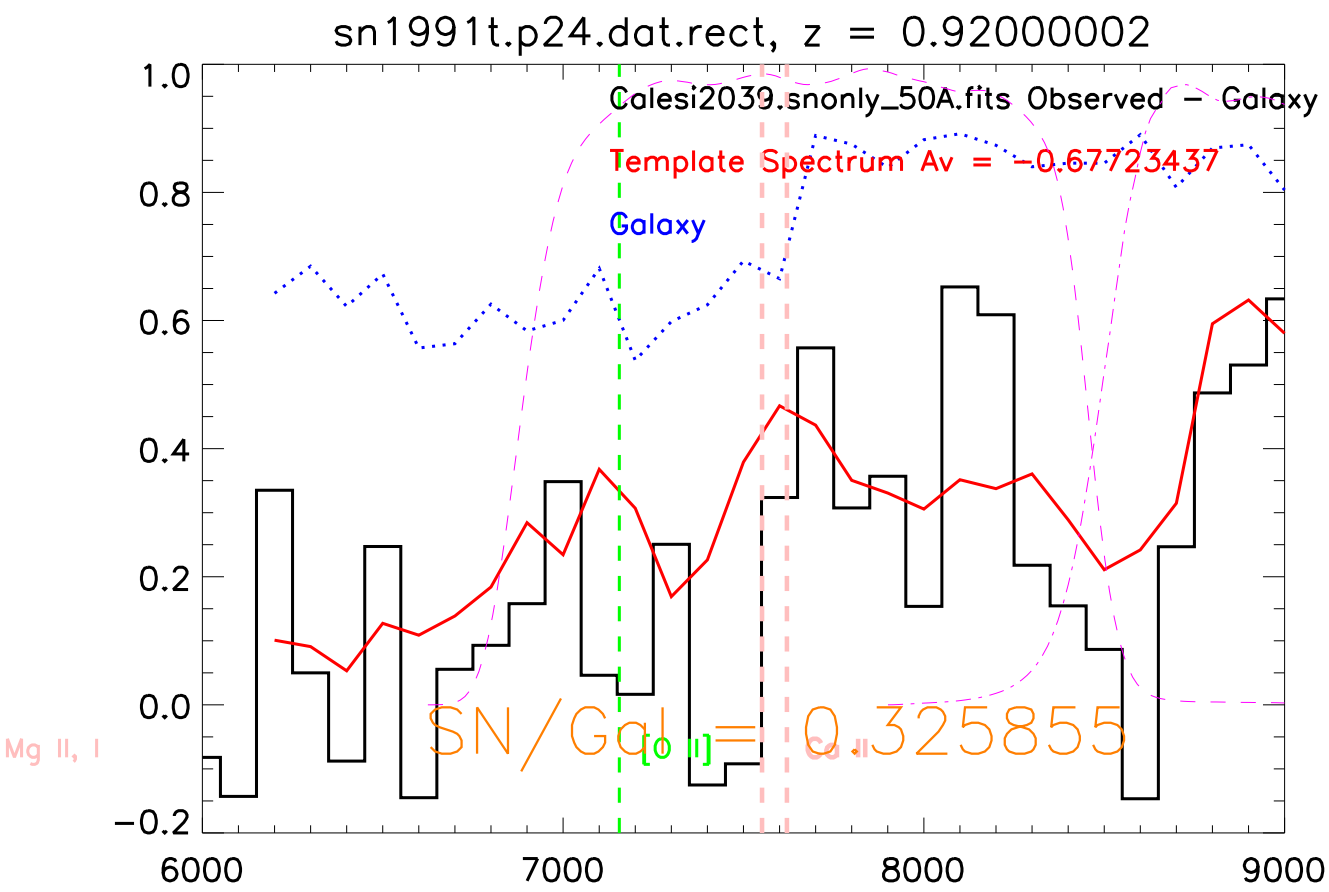
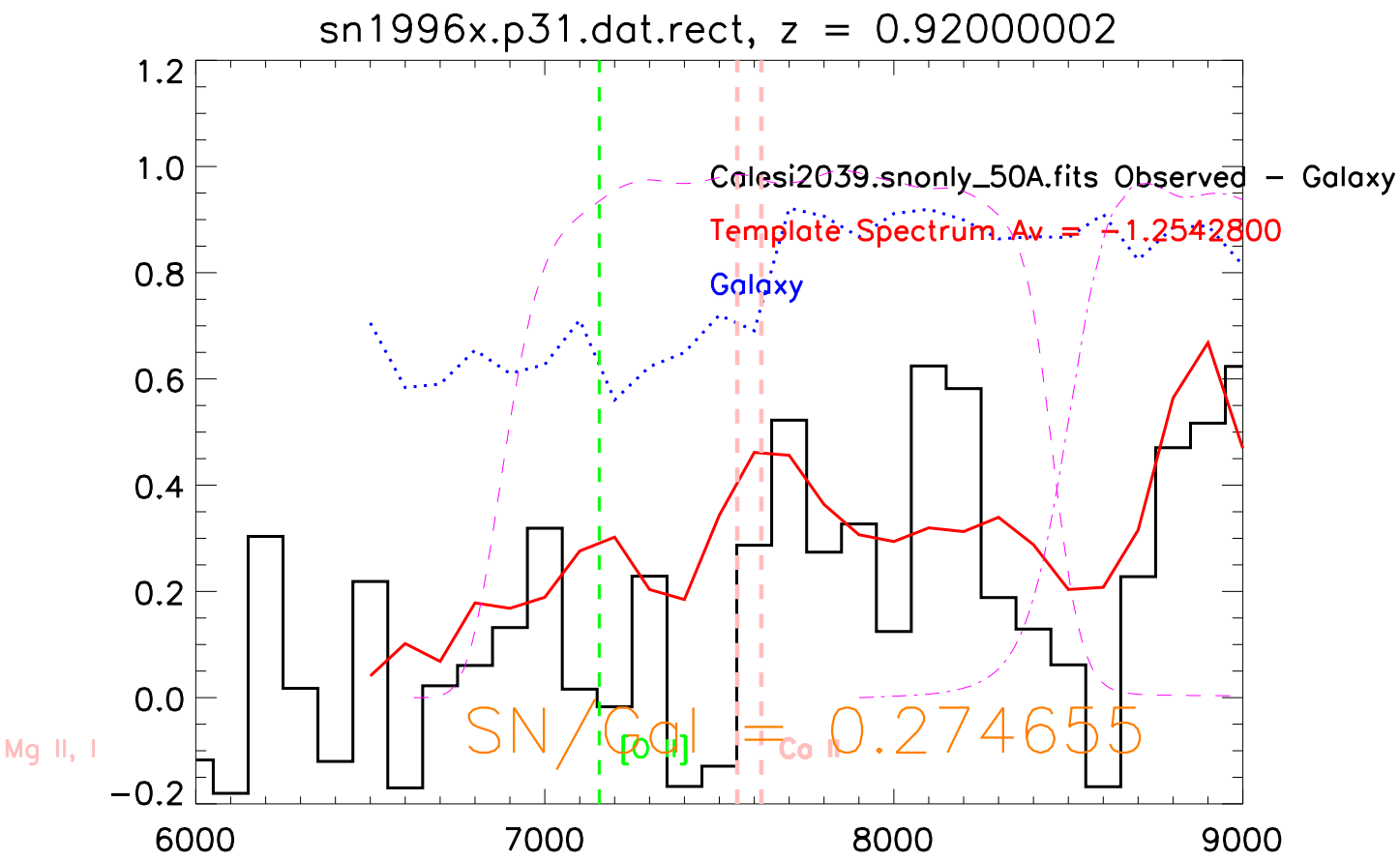
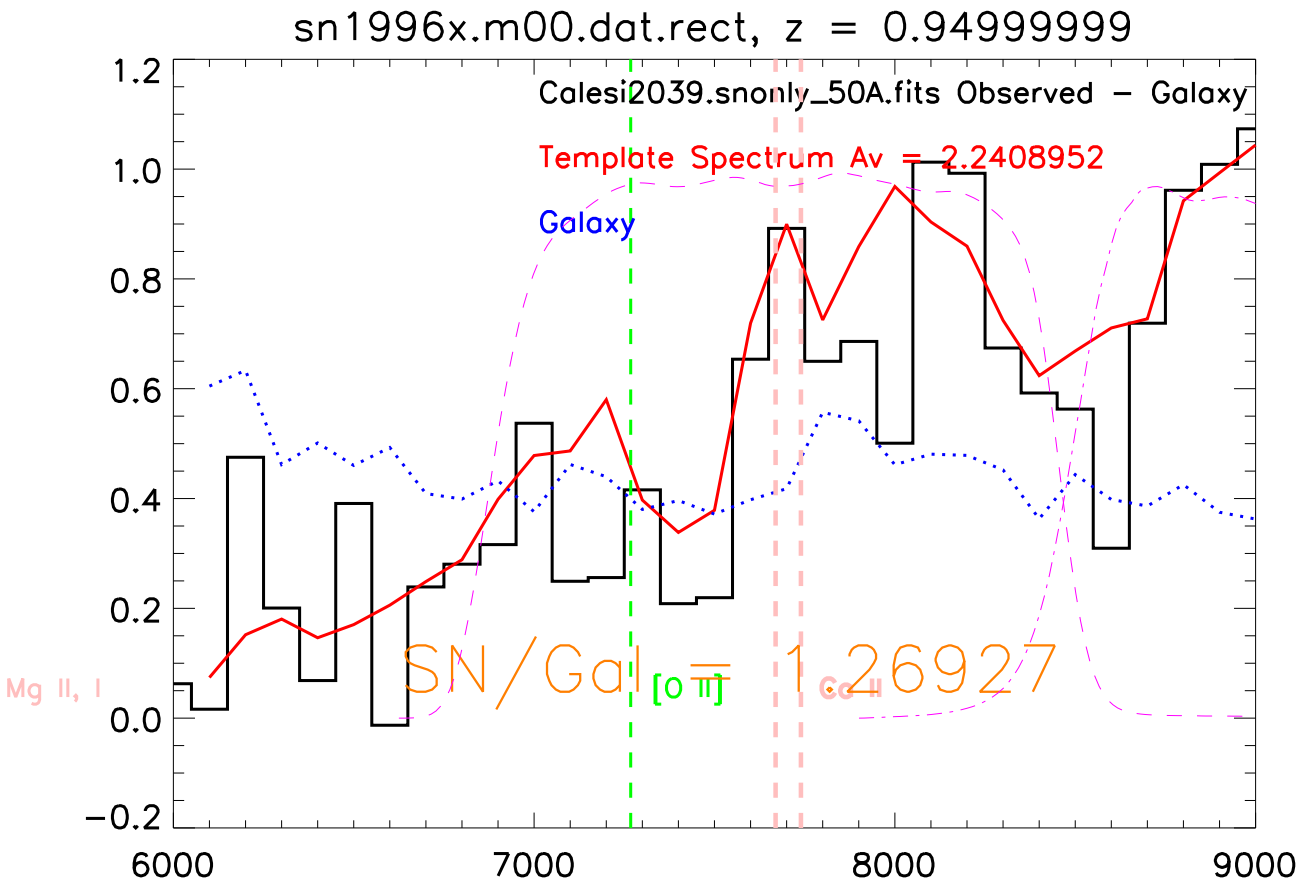
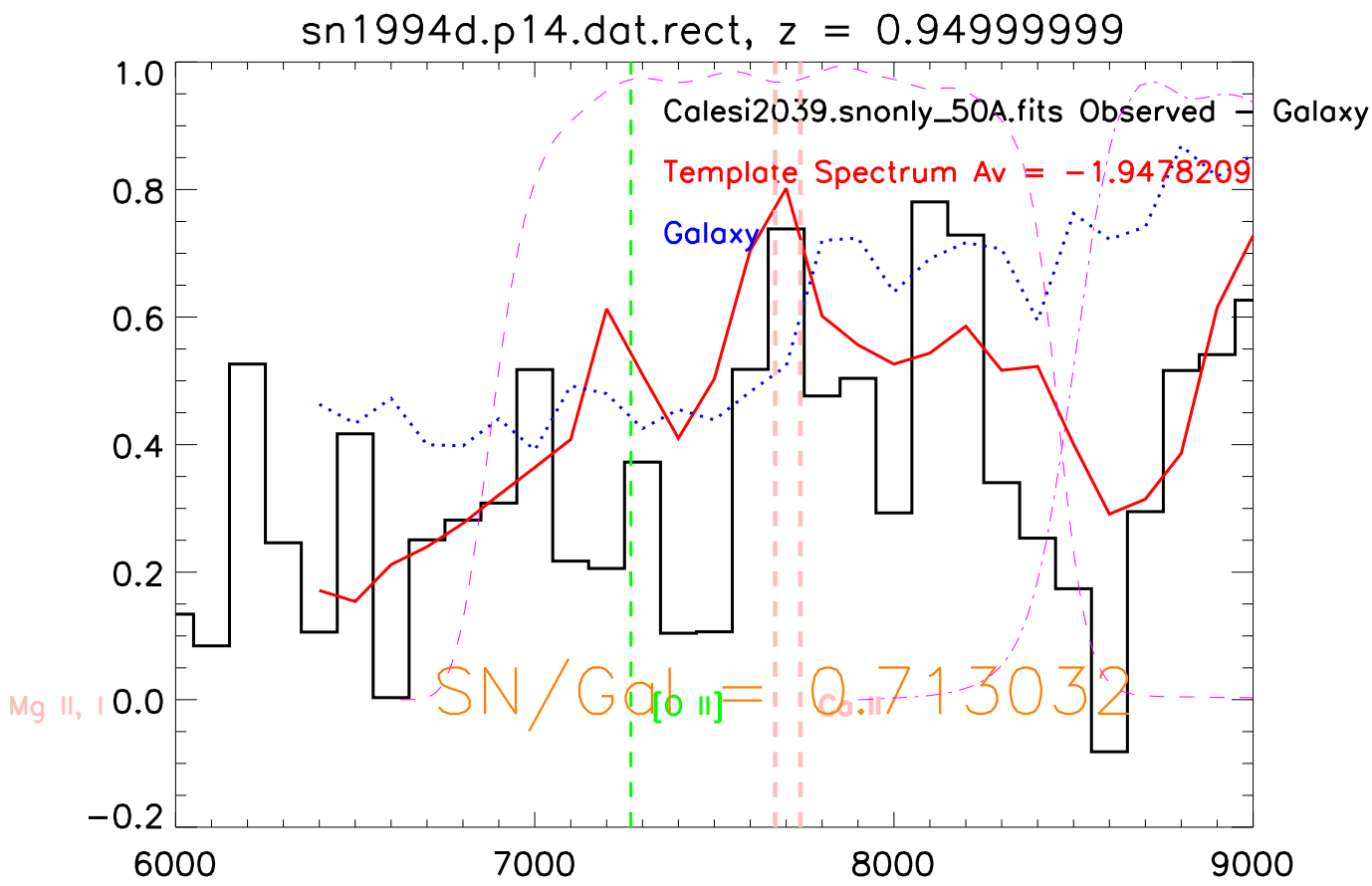
7000
8000
9000

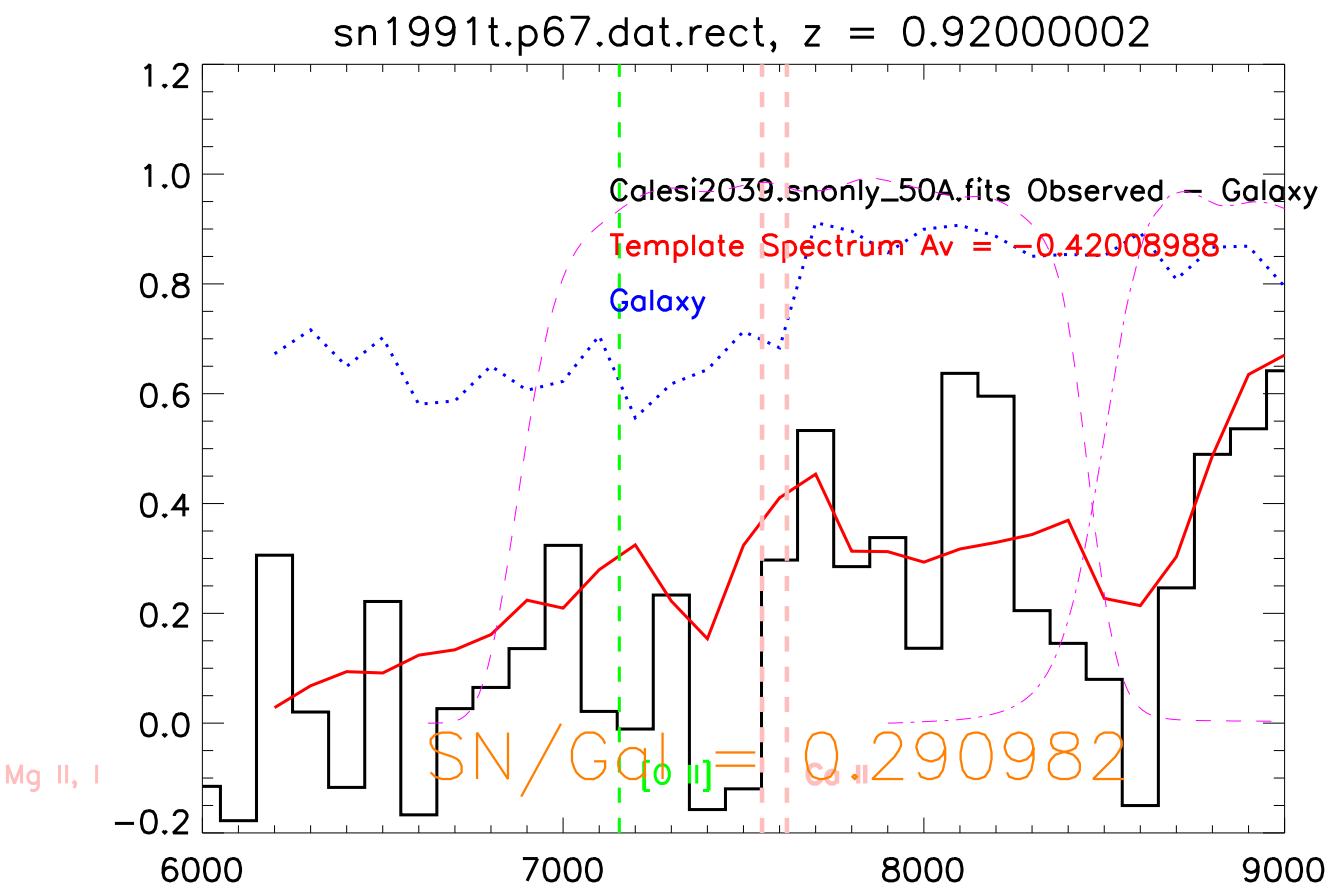

sn1999ee.m08.dat.rect, z = 1.0200000
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = −4.7671001
Galaxy
SN/Gal = 0.313630
[O II]
Ca II
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000

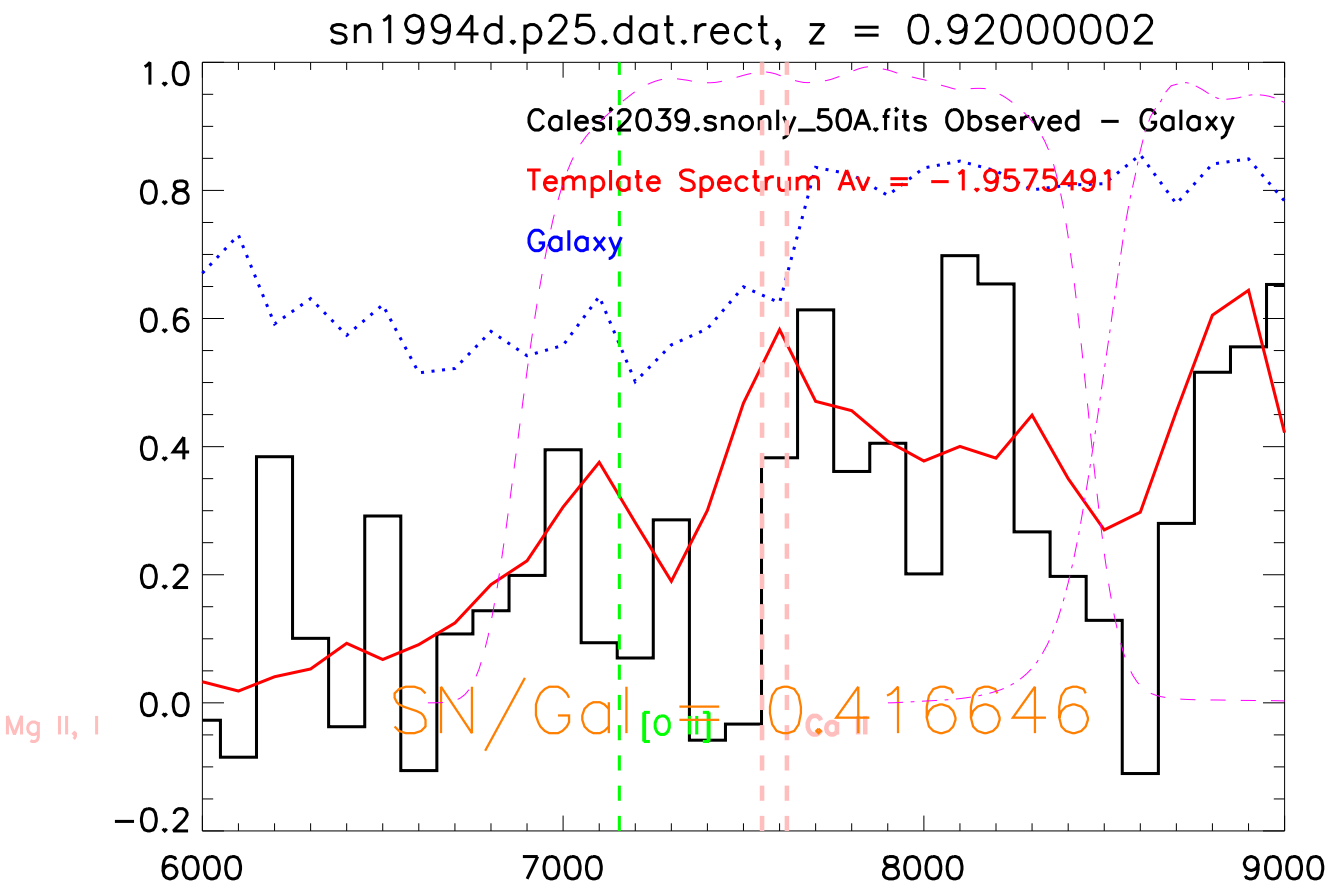

sn1991t.p24.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = −0.6772437
Galaxy
SN/Gal = 0.325855
Mg II, I
[O II]
Ca II
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000

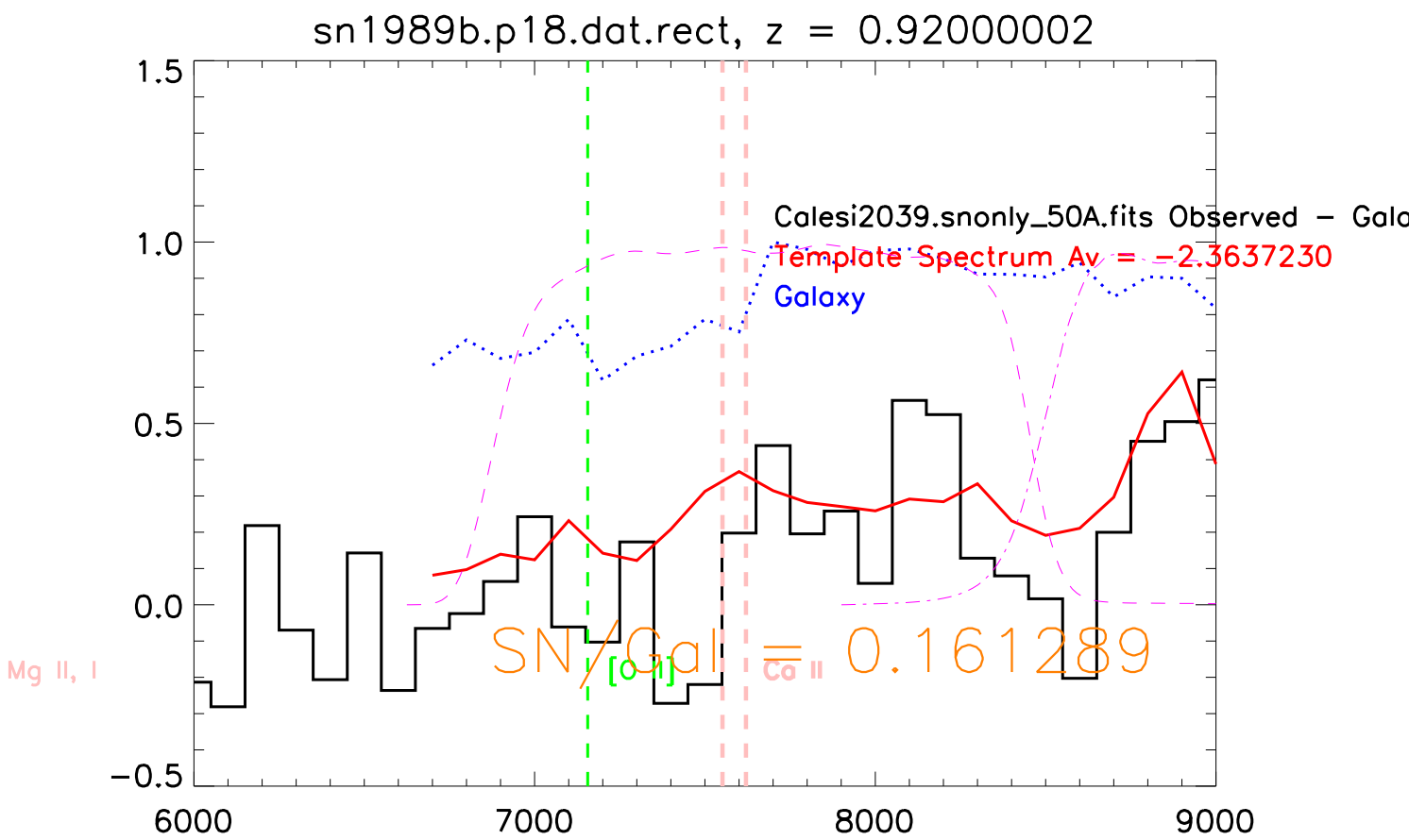

sn1996x.p31.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = −1.2542800
Galaxy
SN/Gal = 0.274655
Mg II, I
[O II]
Ca II
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000

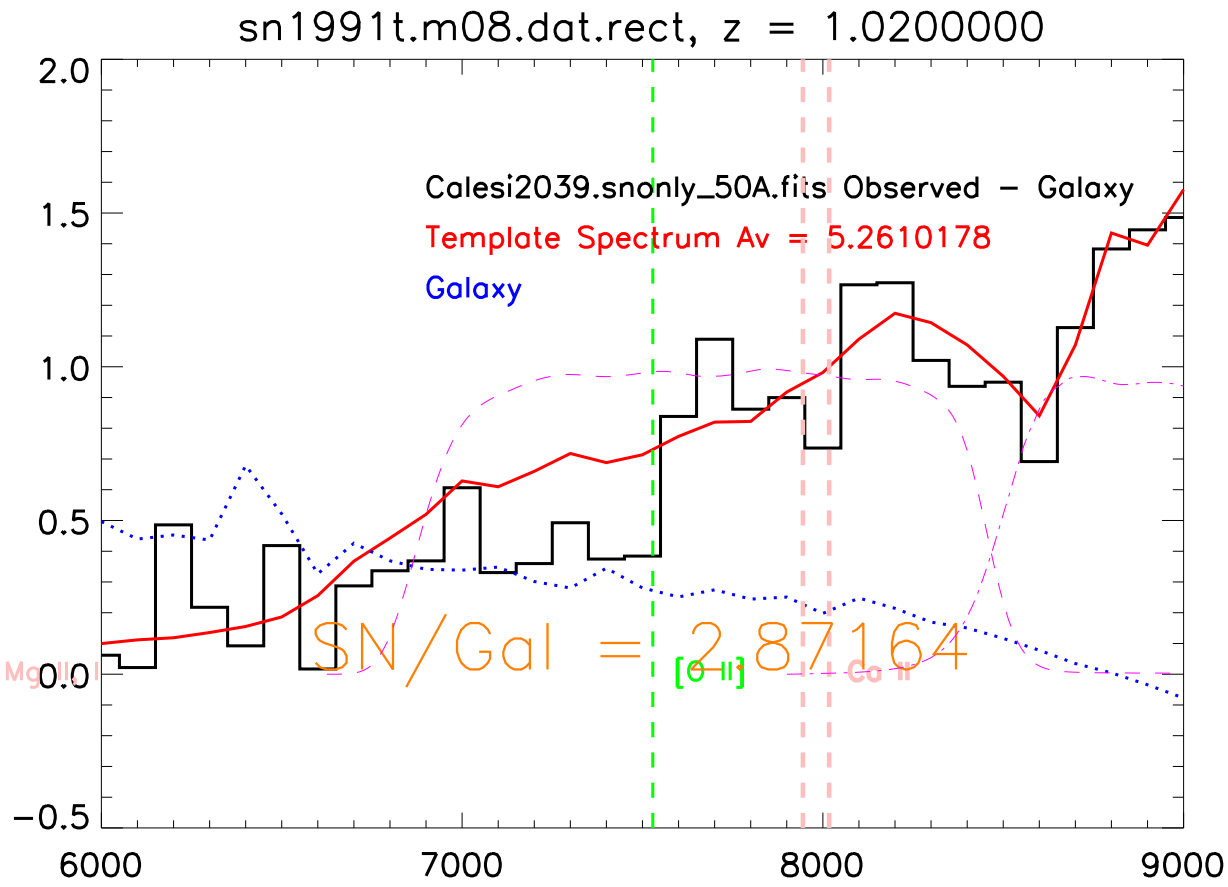

sn1996x.m00.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 2.2408952
Galaxy
SN/Gal = 1.26927
[O II]
Mg II, I
Ca II
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000

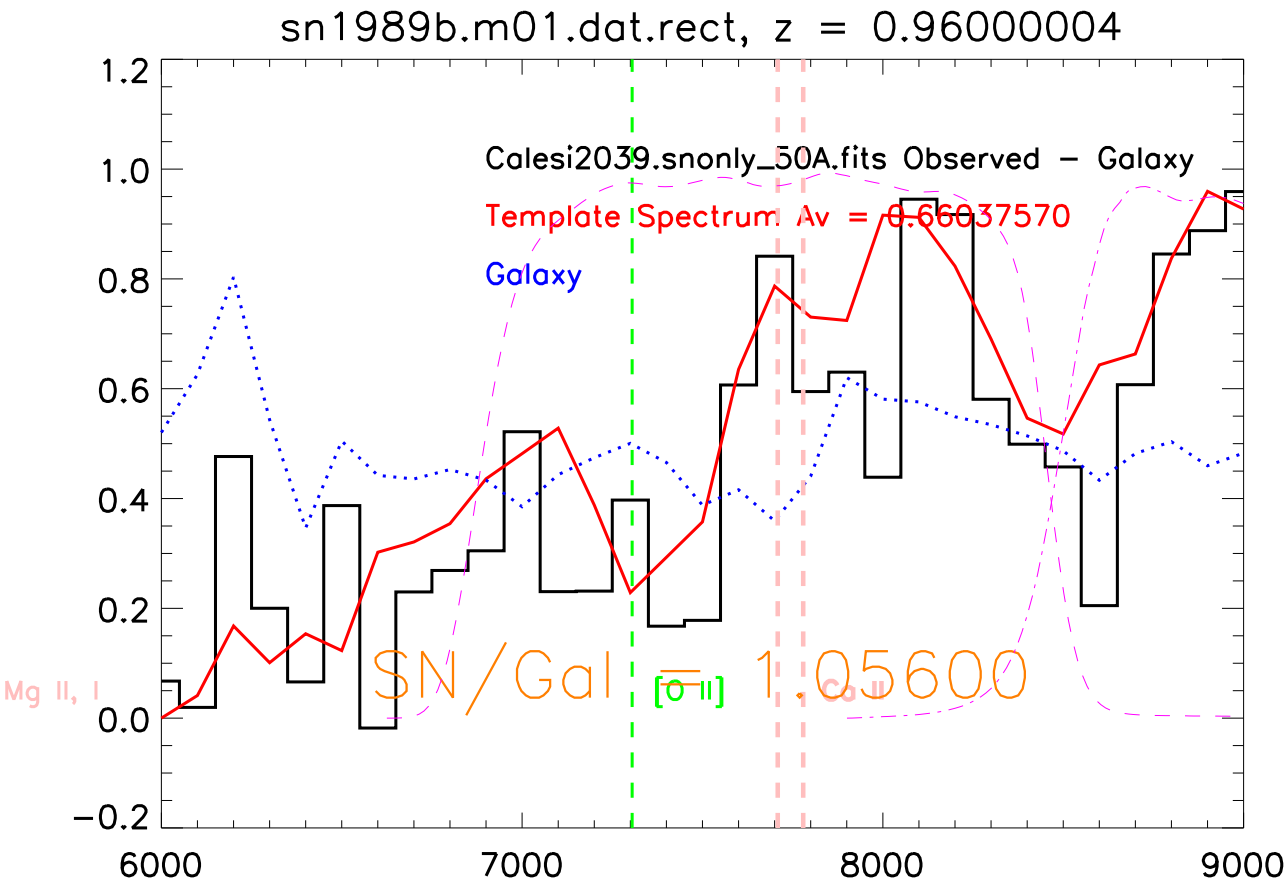

sn1994d.p14.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed
Galaxy
Template Spectrum Av = -1.9478209
Galaxy
SN/Gal = 0.713032
[O II]
Ca II
Mg II, I
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
6000
7000
8000
9000

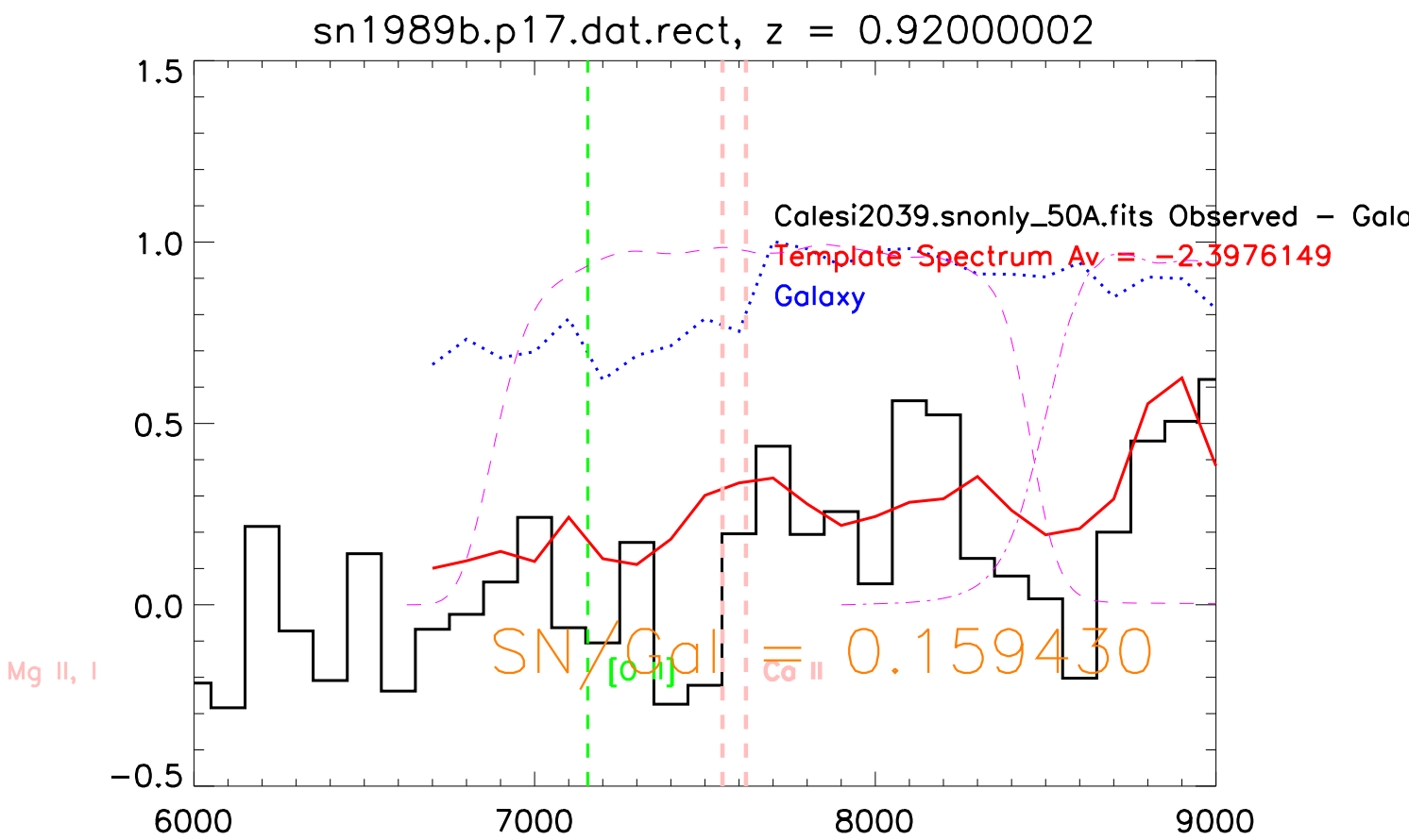

sn1991t.p67.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = –0.42008988
Galaxy
SN/Gal = 0.290982
[O II]
Mg II, I
Ca II
1.2
1.0
0.8
0.6
0.4
0.2
0.0
–0.2
6000
7000
8000
9000

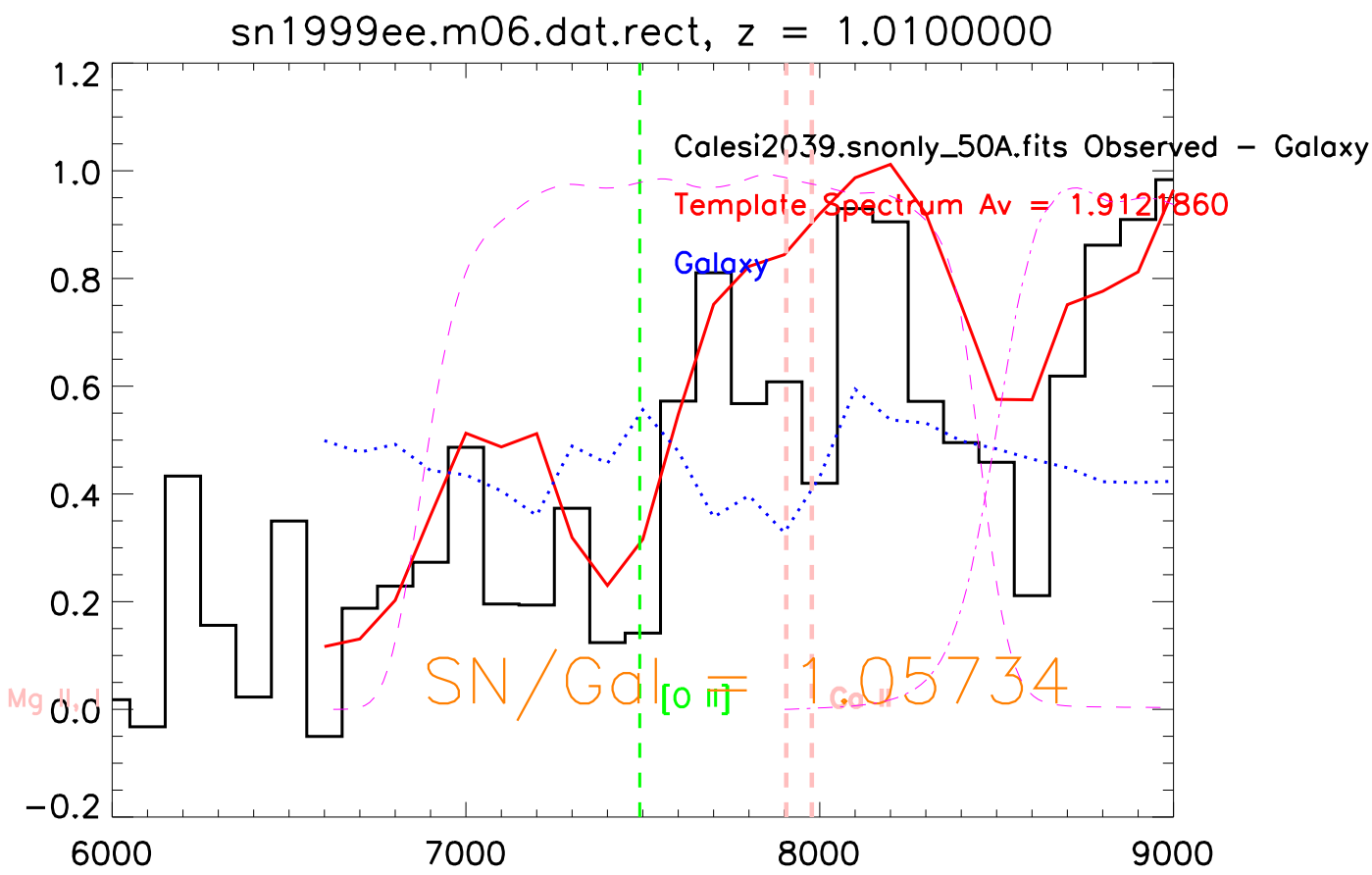

sn1994d.p25.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av. = −1.957549.1
Galaxy
SN/Gal = 0.416646
[O II]
Mg II, I
Ca II
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000

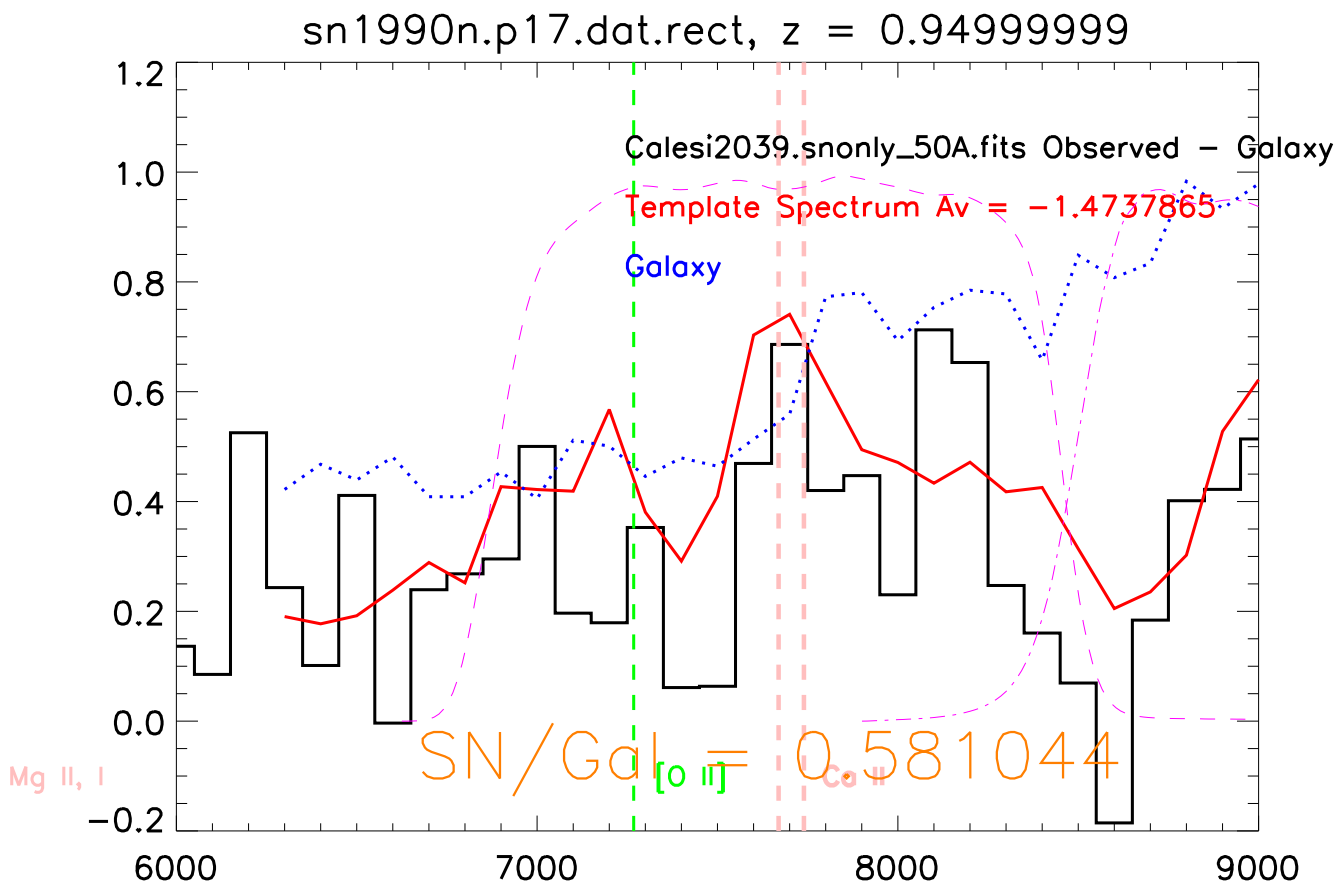

sn1989b.p18.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed – Gala
Template Spectrum Av = −2.3637230
Galaxy
SN/Gal = 0.161289
[O II]
Ca II
Mg II, I
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000

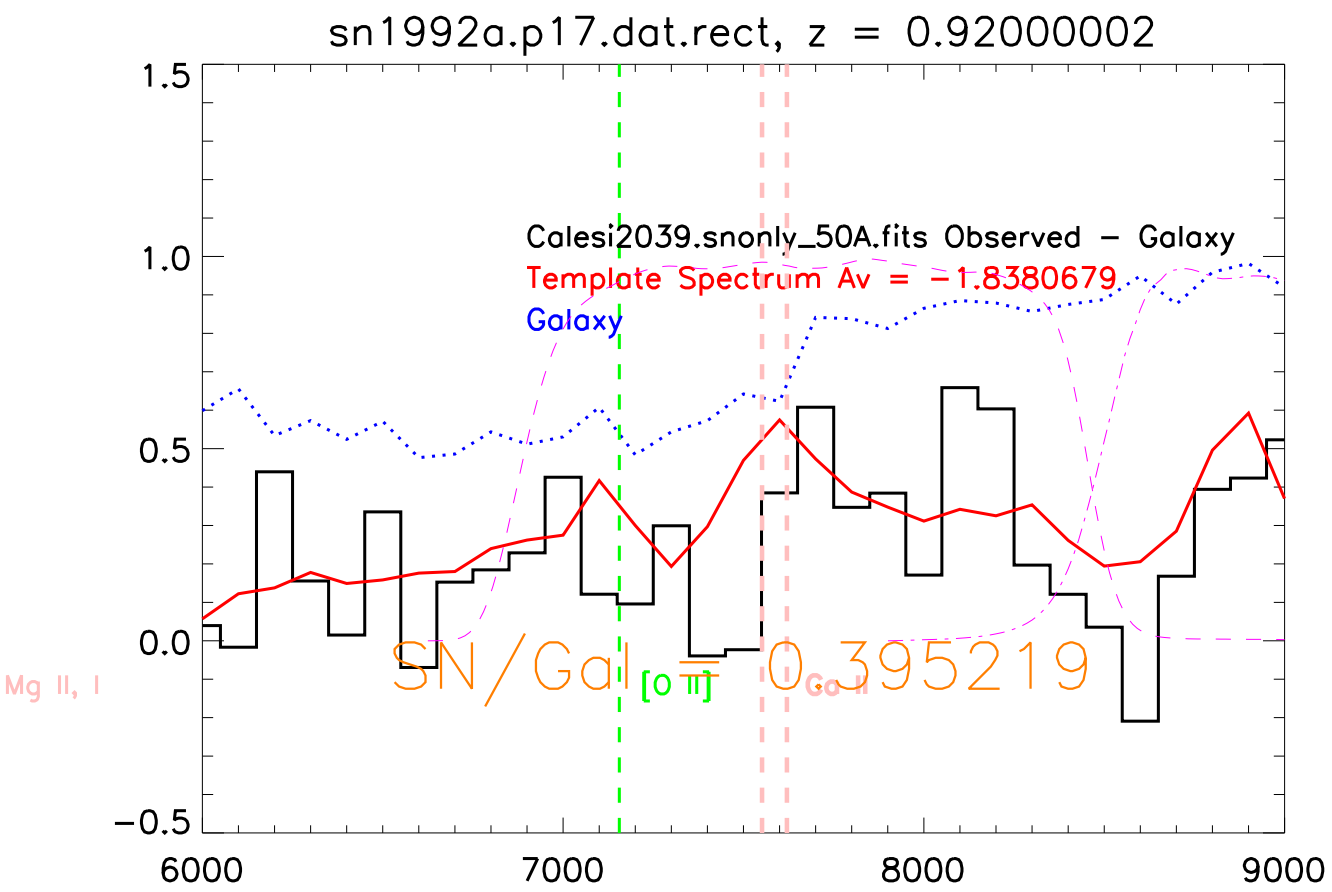

sn1991t.m08.dat.rect, z = 1.0200000
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 5.2610178
Galaxy
SN/Gal = 2.87164
[O II]
2.0
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000

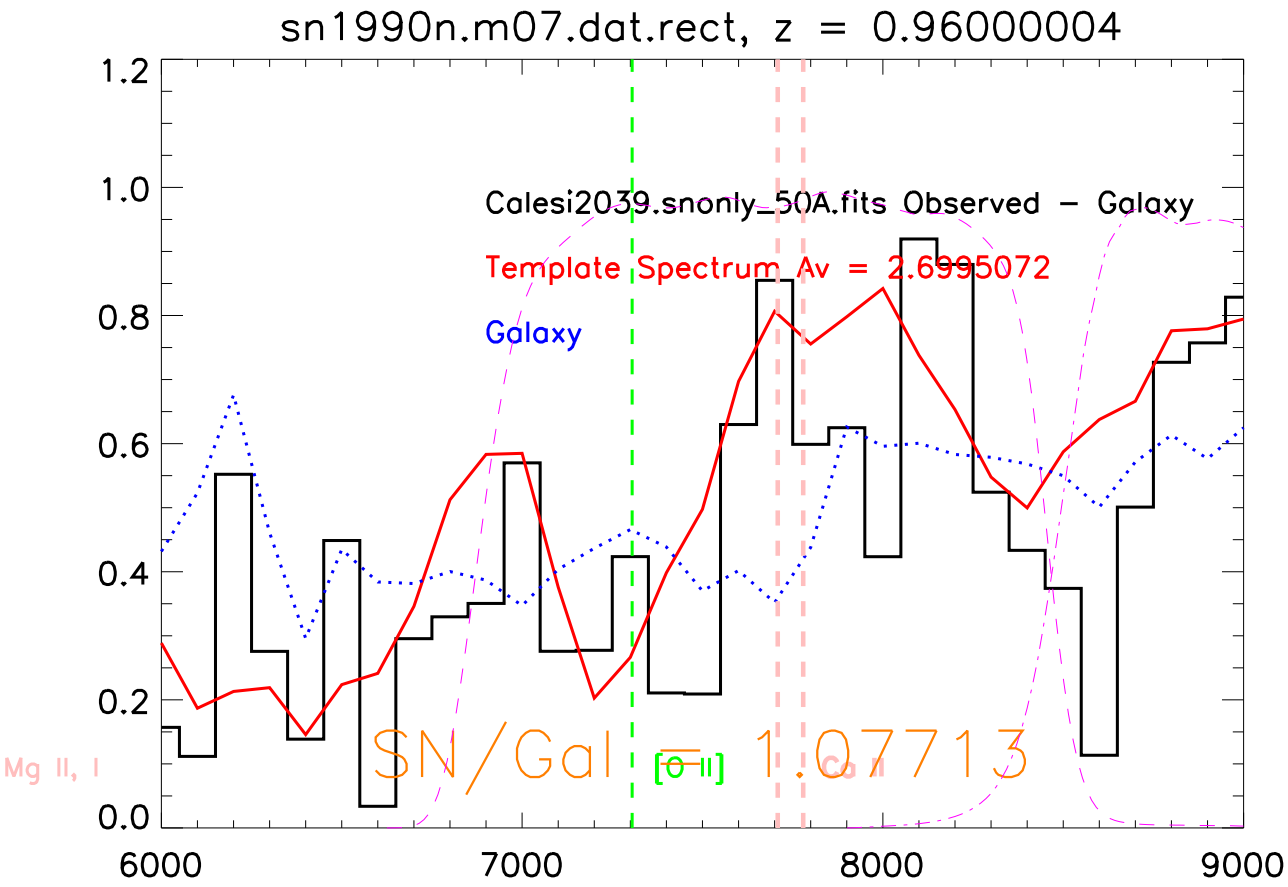

sn1989b.m01.dat.rect, z = 0.96000004
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 0.66037570
Galaxy
SN/Gal = 1.05600
[O II]
Mg II, I
Ca II
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000

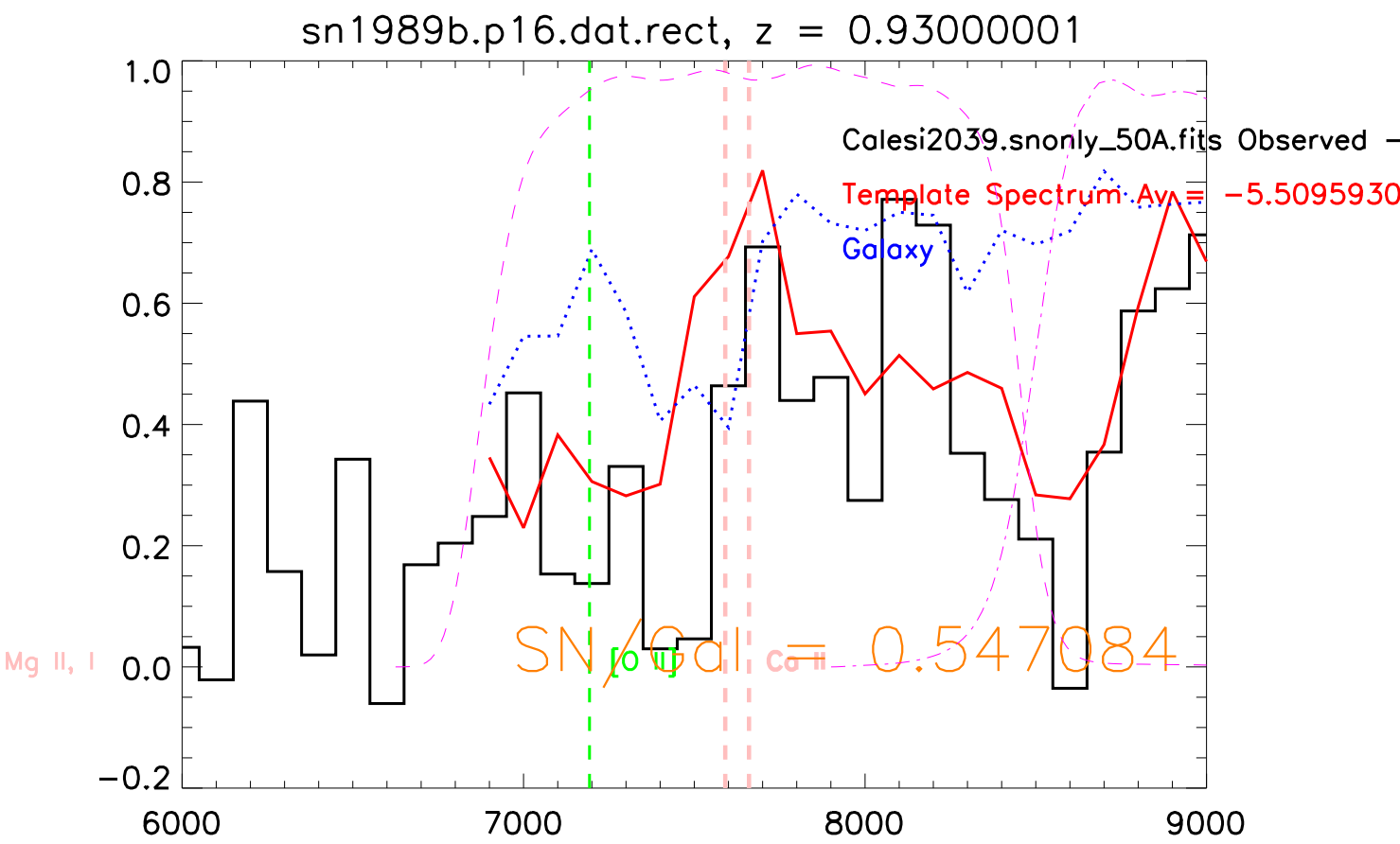

sn1989b.p17.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed – Gala
Template Spectrum Av = −2.3976149
Galaxy
SN/Gal = 0.159430
[O II]
Ca II
Mg II, I
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000

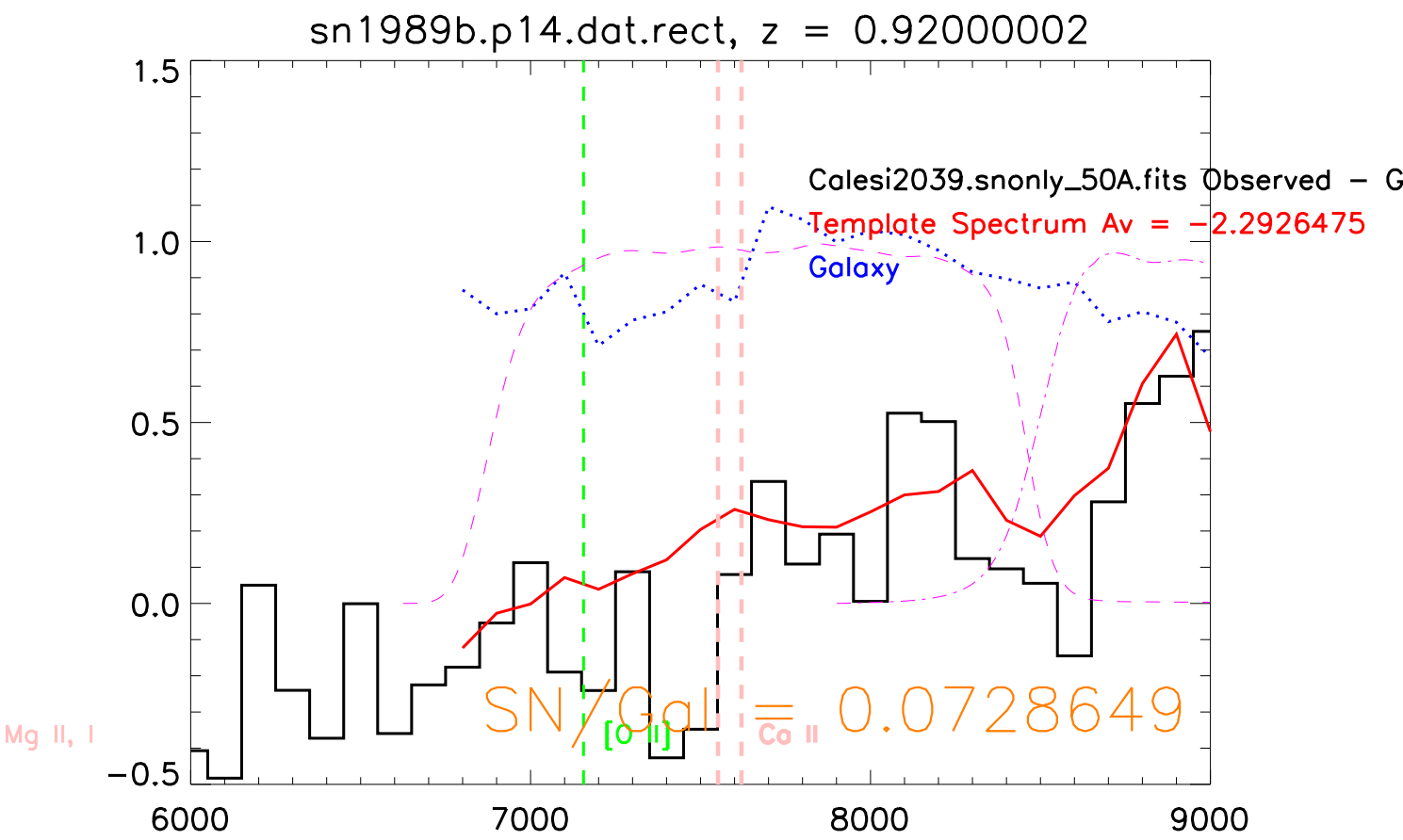

sn1999ee.m06.dat.rect, z = 1.0100000
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = 1.9121860
Galaxy
SN/Gal = 1.05734
[O II]
Mg II
Ca II
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000

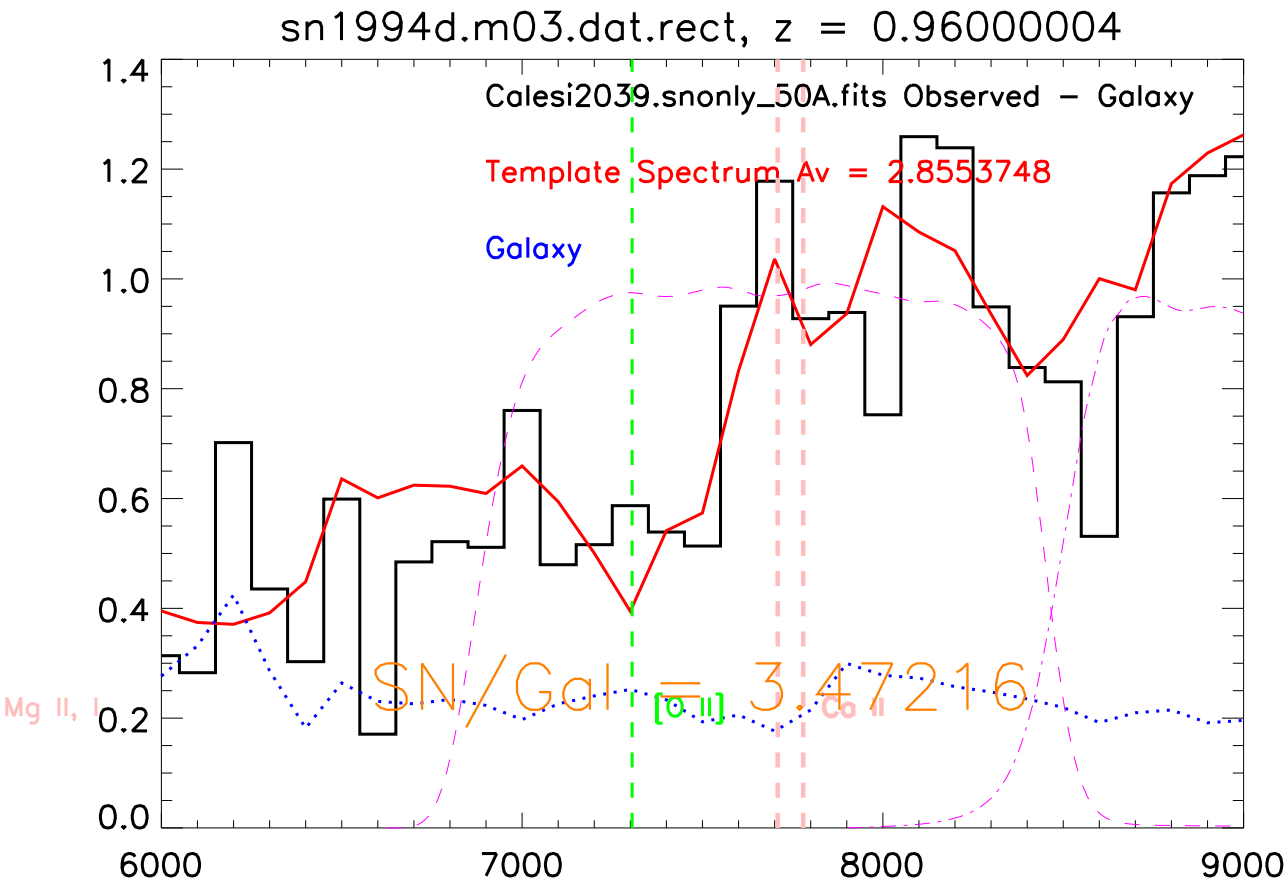

sn1990n.p17.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = −1.4737865
Galaxy
SN/Gal = 0.581044
[O II]
Ca II
Mg II, I
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000

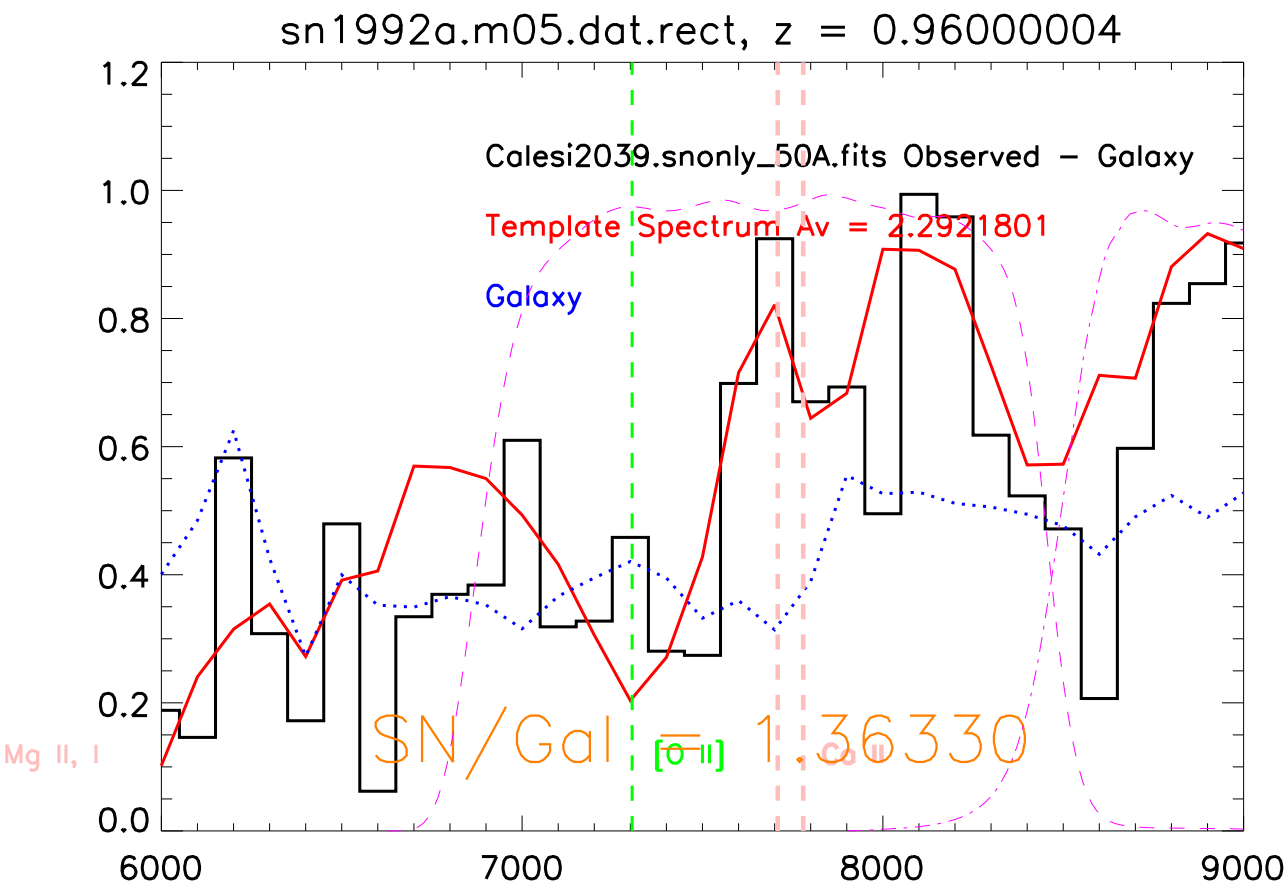

sn1992a.p17.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = −1.8380679
Galaxy
SN/Gal = 0.395219
[O II]
Ca II
Mg II, I
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000

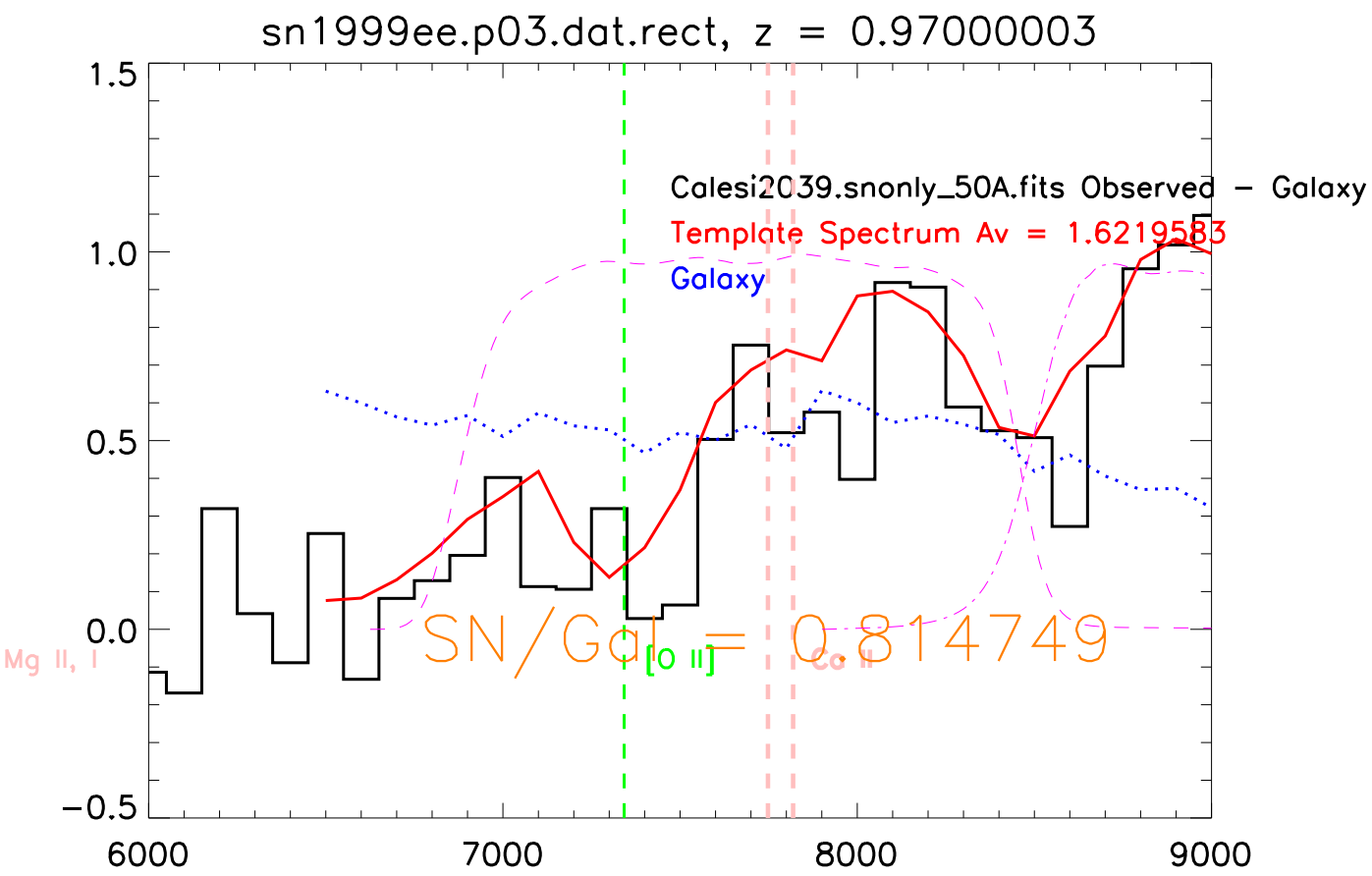

sn1990n.m07.dat.rect, z = 0.96000004
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 2.6995072
Galaxy
SN/Gal = 1.07713
[O II]
Mg II, I
Ca II
1.2
1.0
0.8
0.6
0.4
0.2
0.0
6000
7000
8000
9000

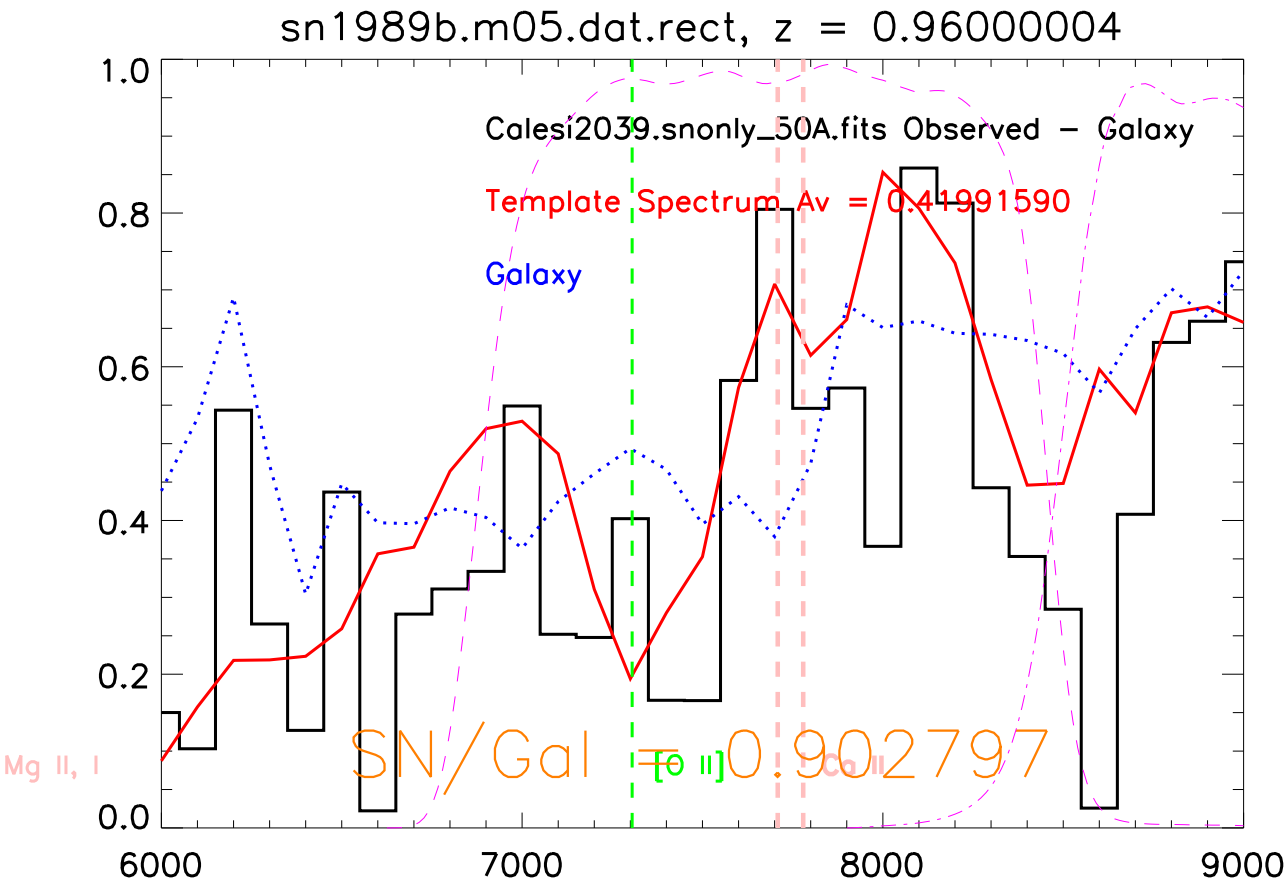

sn1989b.p16.dat.rect, z = 0.93000001
Calesi2039.snonly_50A.fits Observed -
Template Spectrum Av = -5.5095930
Galaxy
SN/Gal = 0.547084
Mg II, I
[O II]
Ca II
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000

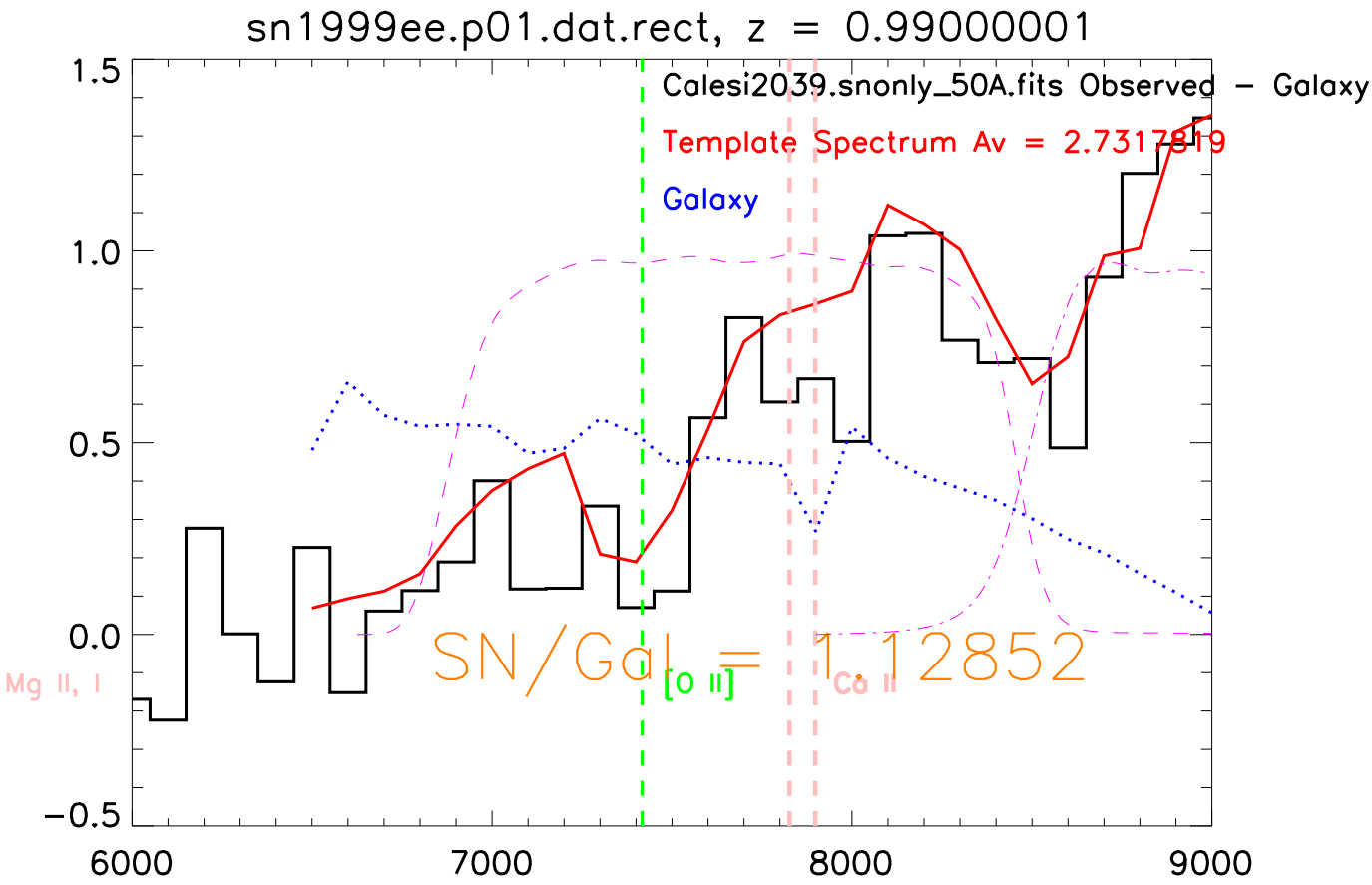

sn1989b.p14.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed – G
Template Spectrum Av = −2.2926475
Galaxy
SN/Gal = 0.0728649
Mg II, I
[O II]
Ca II
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000

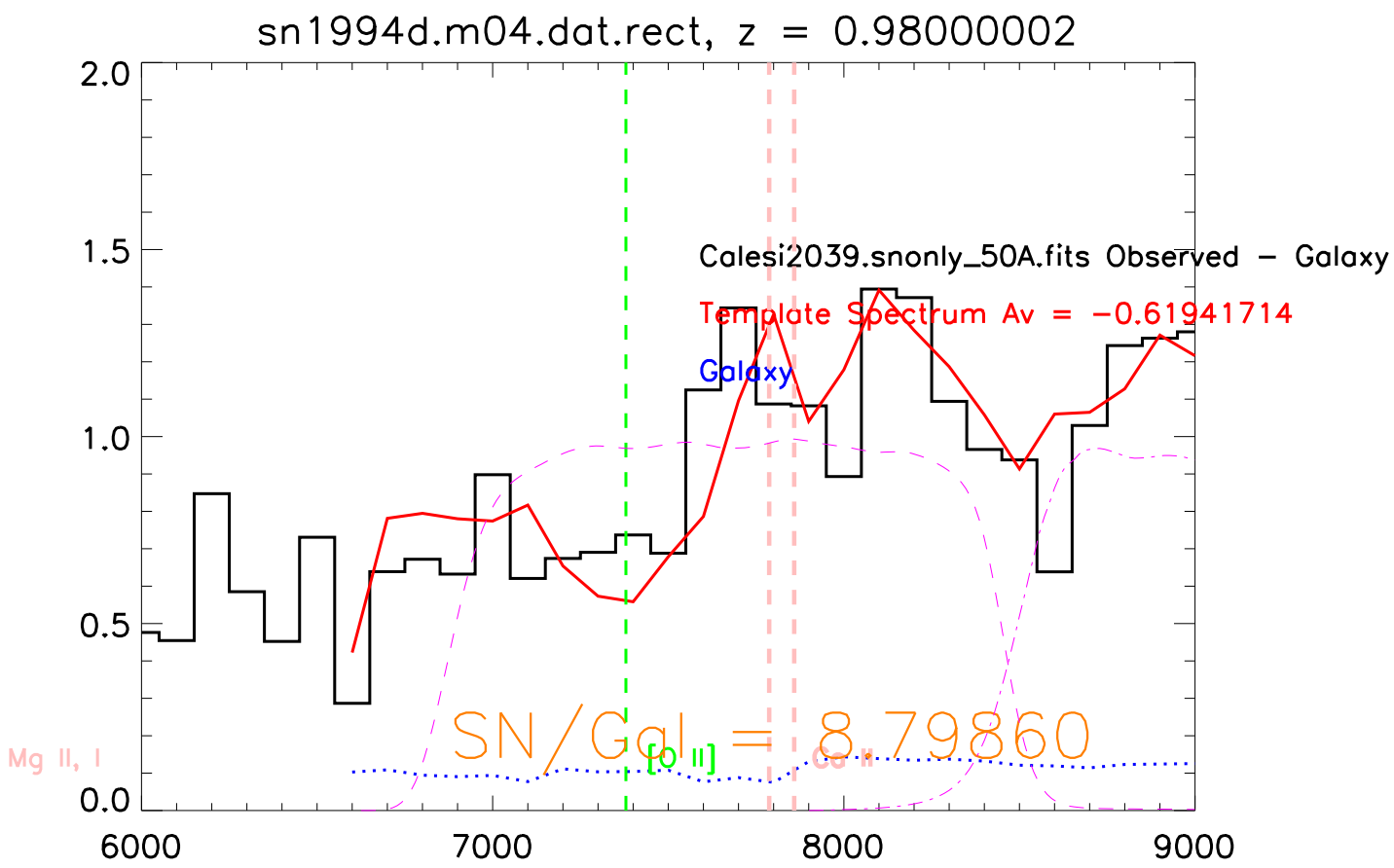

sn1994d.m03.dat.rect, z = 0.96000004
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 2.8553748
Galaxy
SN/Gal = 3.47216
[O II]
Ca II
Mg II, I
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
6000
7000
8000
9000

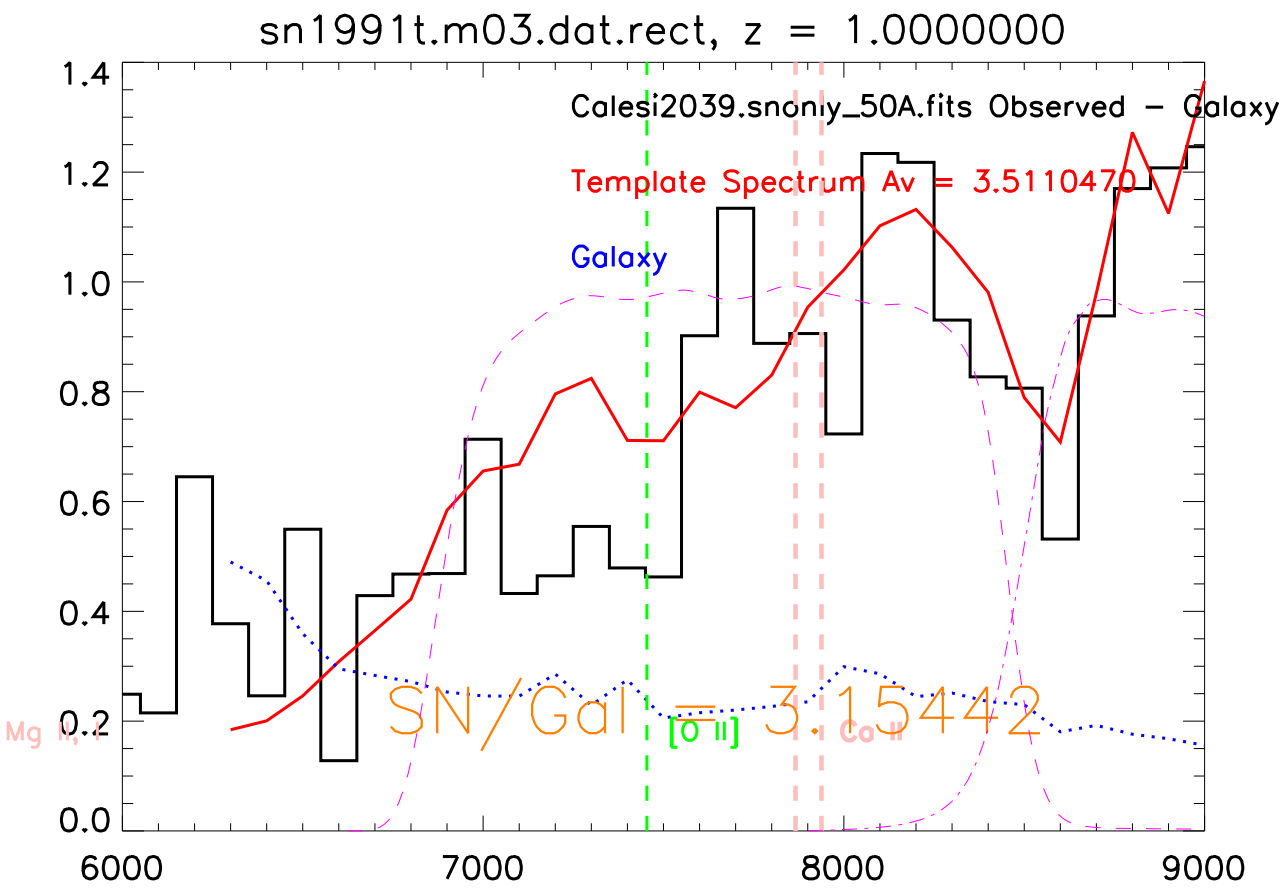

sn1992a.m05.dat.rect, z = 0.96000004
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 2.2921801
Galaxy
SN/Gal = 1.36330
[O II]
Mg II, I
Ca II
1.2
1.0
0.8
0.6
0.4
0.2
0.0
6000
7000
8000
9000

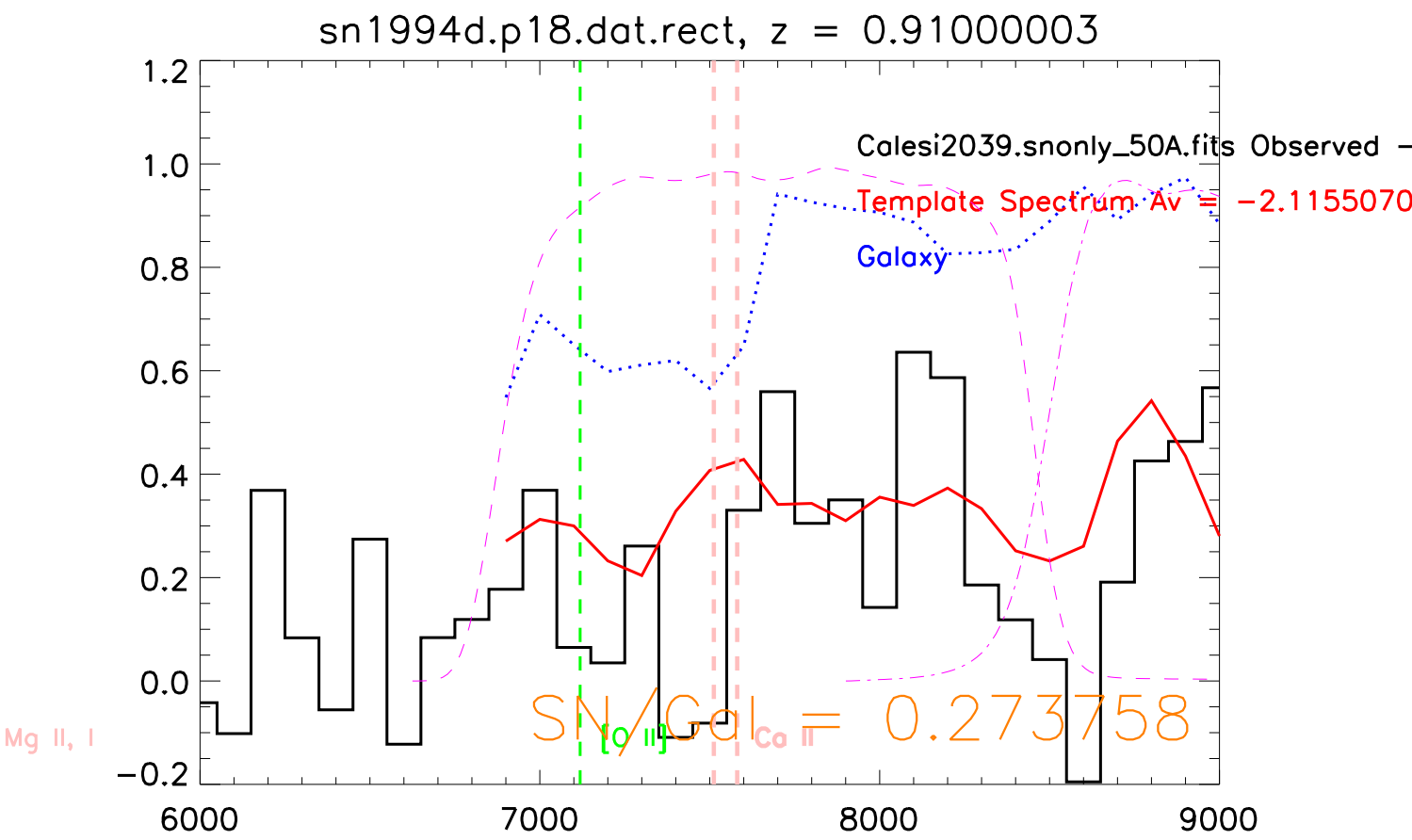

sn1999ee.p03.dat.rect, z = 0.97000003
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 1.6219583
Galaxy
SN/Gal = 0.814749
[O II]
Mg II, I
Ca II
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000

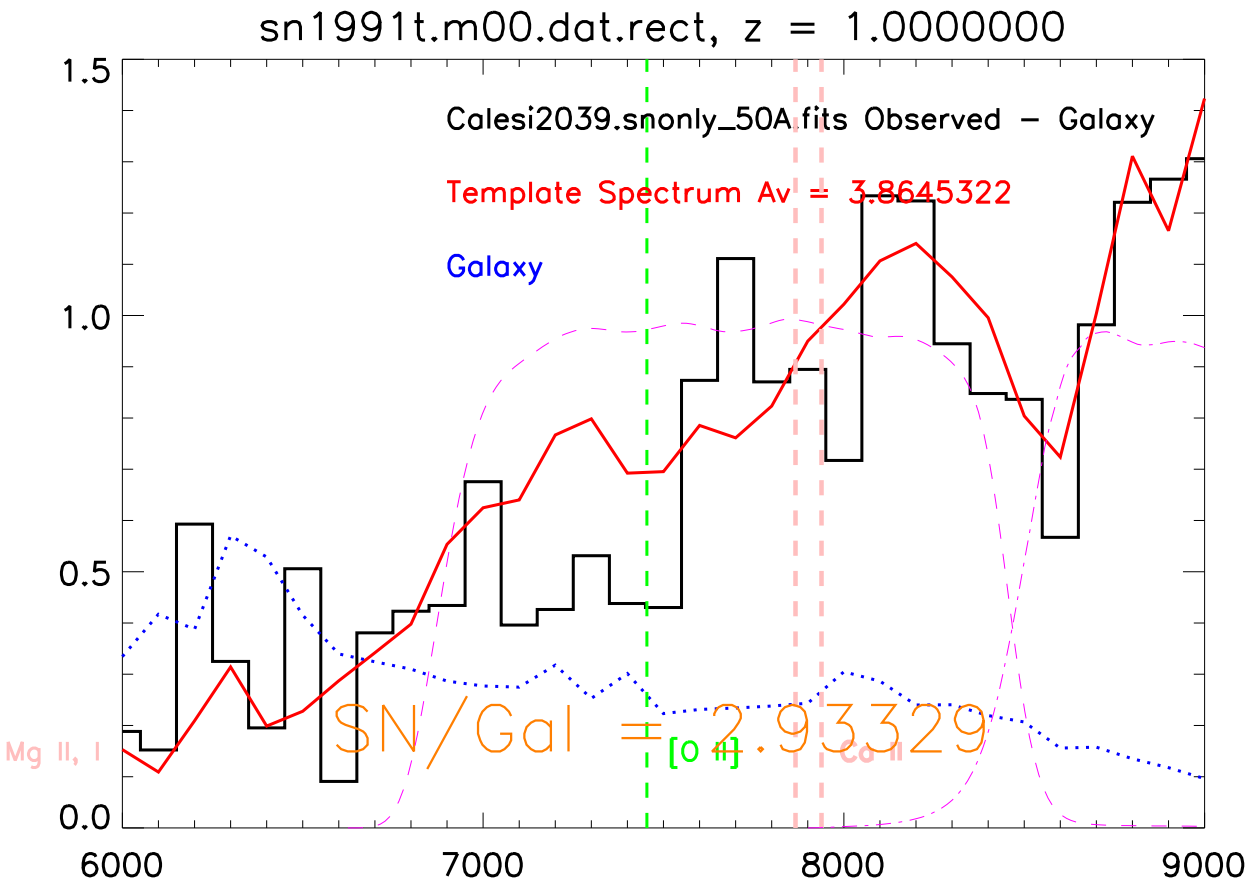

sn1989b.m05.dat.rect, z = 0.96000004
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = 0.41991590
Galaxy
SN/Gal = 0.902797
Mg II, I
[O II]
Ca II
1.0
0.8
0.6
0.4
0.2
0.0
6000
7000
8000
9000

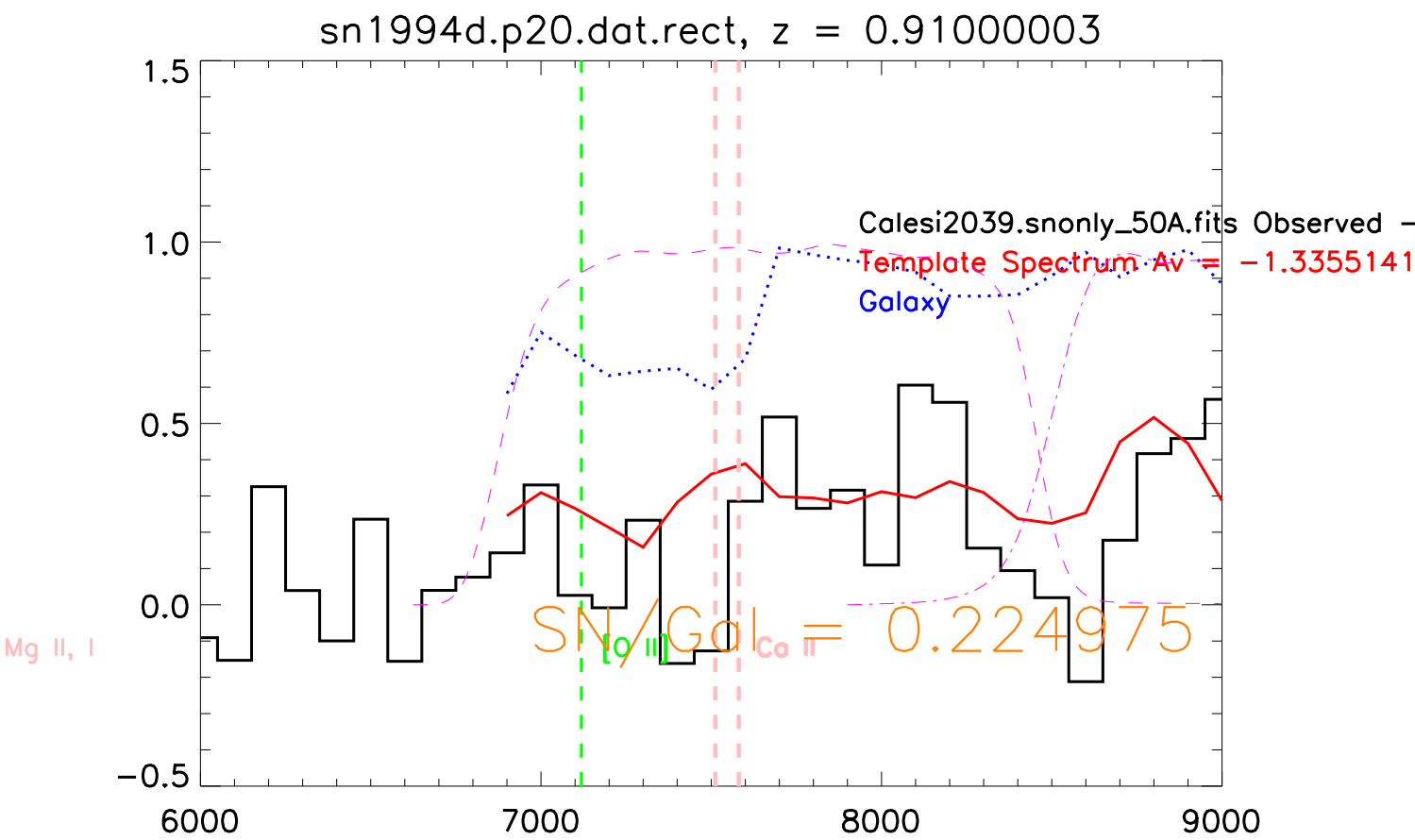

sn1999ee.p01.dat.rect, z = 0.99000001
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 2.7317819
Galaxy
SN/Gal = 1.12852
Mg II, I
[O II]
Ca II
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000

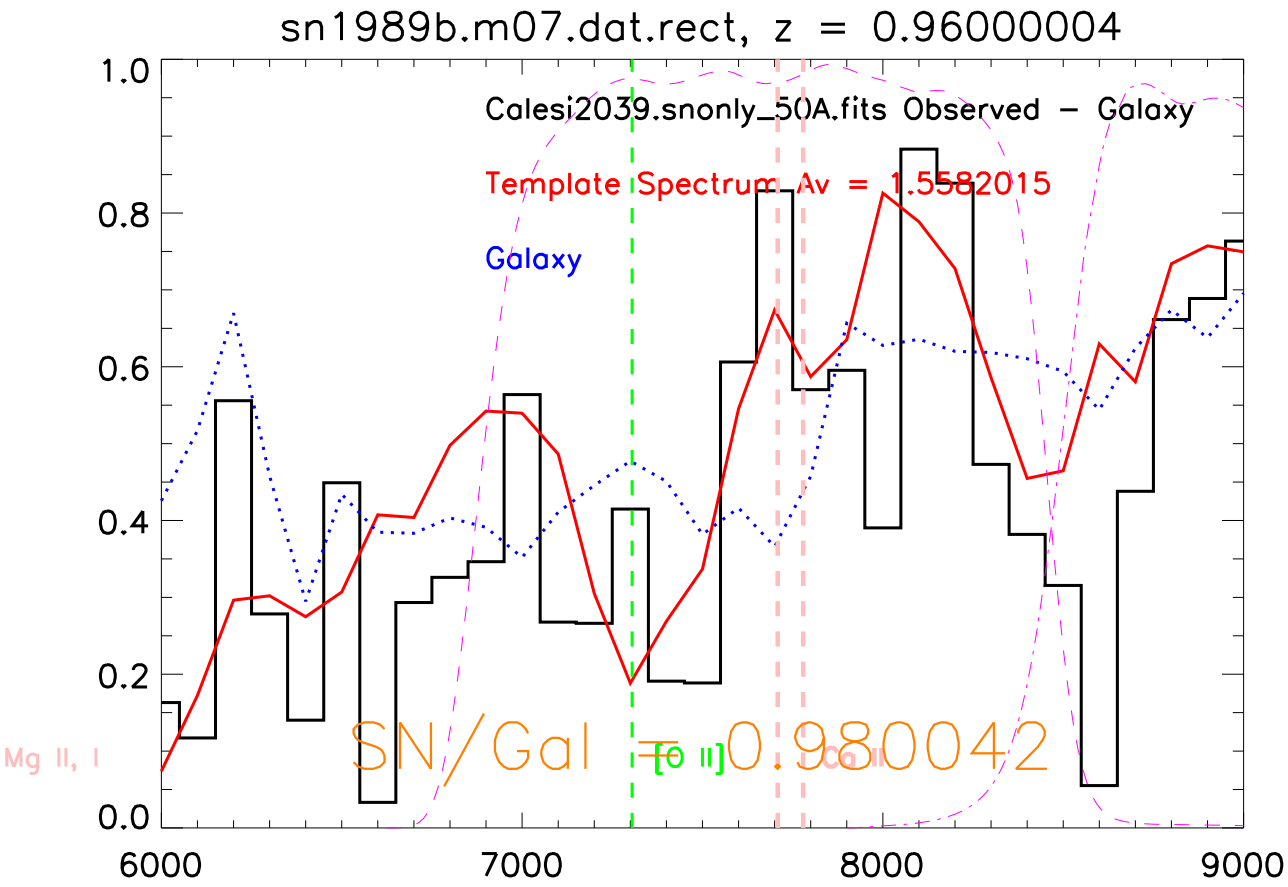

sn1994d.m04.dat.rect, z = 0.98000002
2.0
1.5
1.0
0.5
0.0
6000
7000
8000
9000
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = −0.61941714
Galaxy
SN/Gal = 8.79860
Mg II, I
[O II]
Ca H

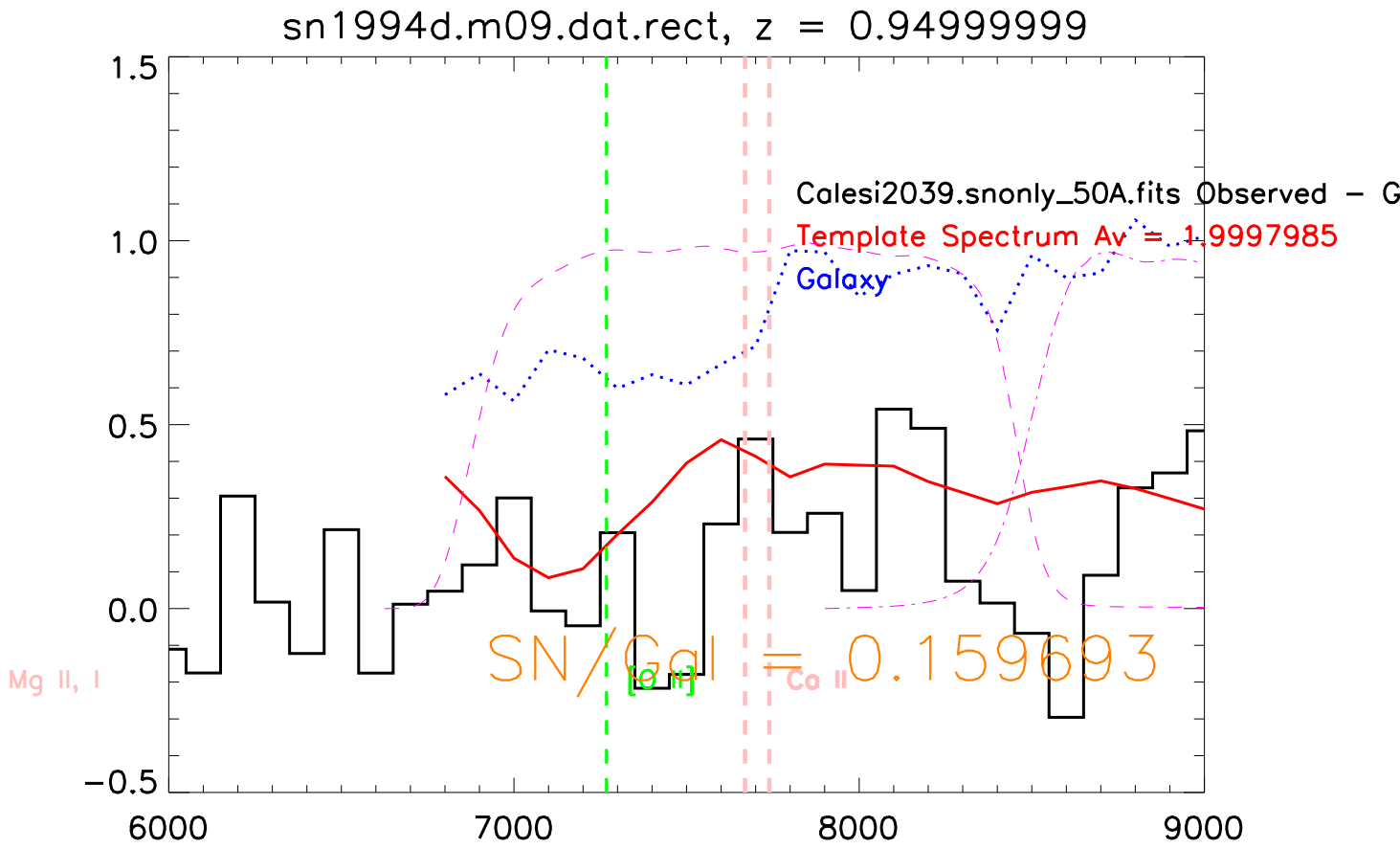

sn1991t.m03.dat.rect, z = 1.0000000
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum Av = 3.5110470
Galaxy
SN/Gal = 3.15442
[O II]
Ca II
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
6000
7000
8000
9000

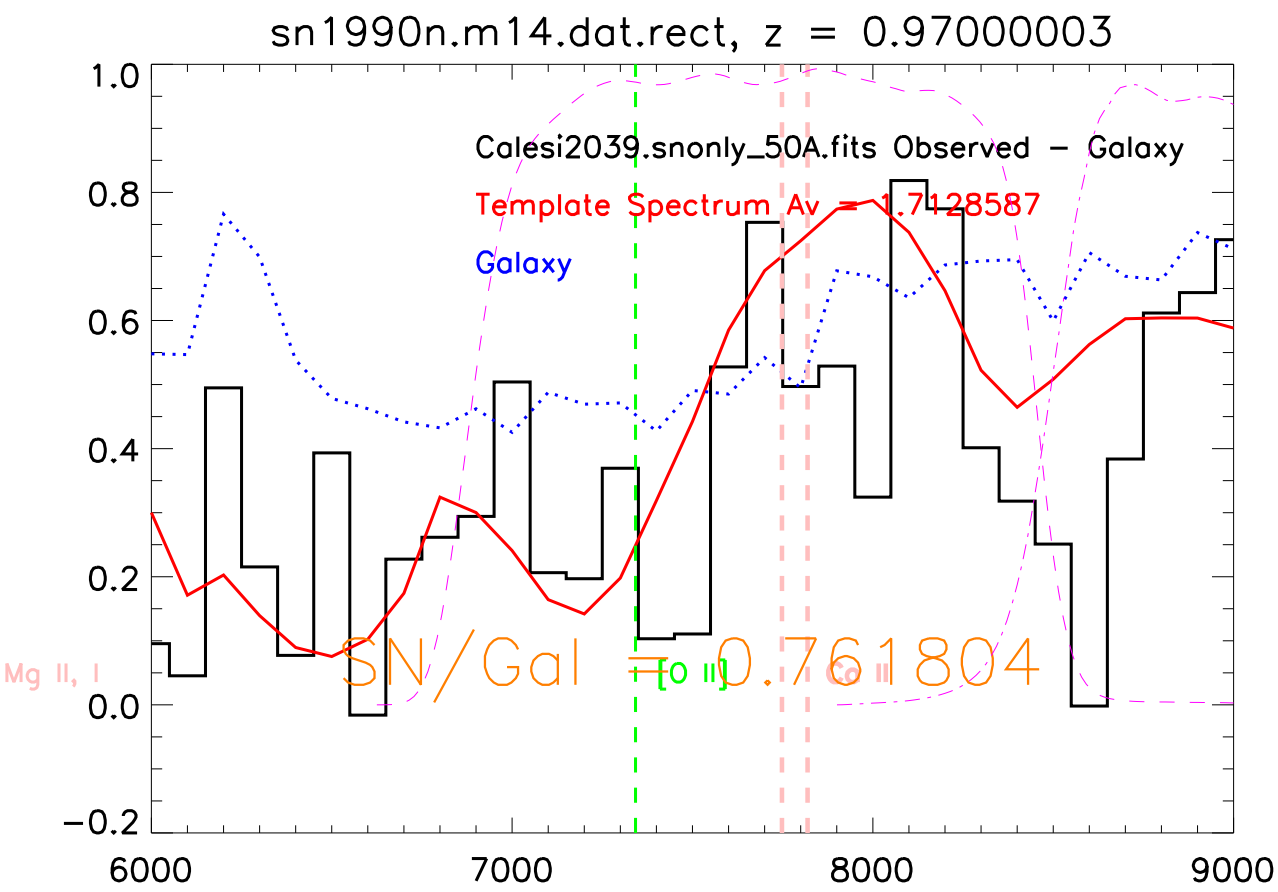

sn1994d.p18.dat.rect, z = 0.91000003
Calesi2039.snonly_50A.fits Observed -
Template Spectrum Av = -2.1155070
Galaxy
SN/Gal = 0.273758
Mg II, I
[O II]
Ca II
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
6000
7000
8000
9000

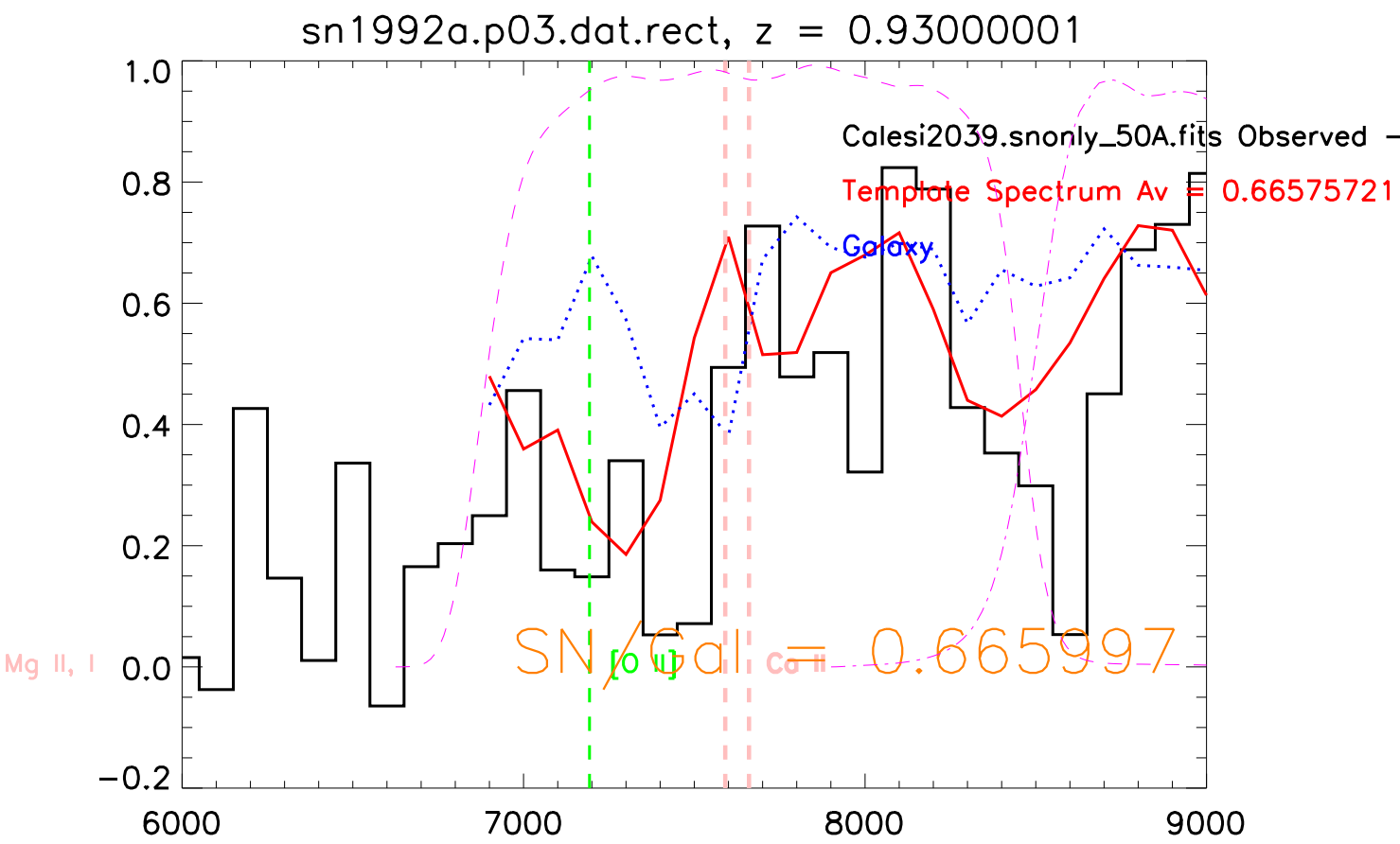

sn1991t.m00.dat.rect, z = 1.0000000
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 3.8645322
Galaxy
SN/Gal = 2.93329
[O II]
Ca II
Mg II, I
1.5
1.0
0.5
0.0
6000
7000
8000
9000

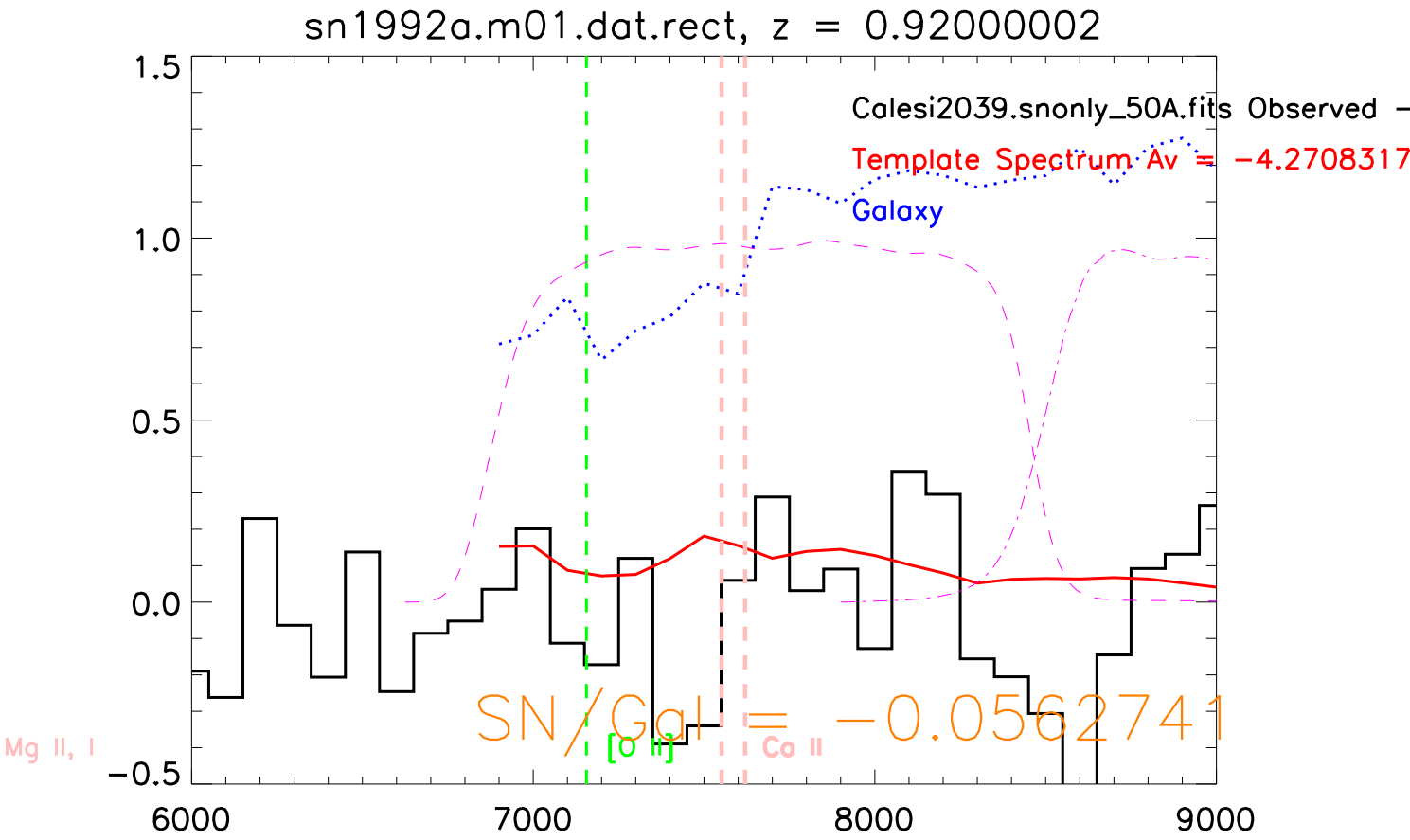

sn1994d.p20.dat.rect, z = 0.91000003
Calesi2039.snonly_50A.fits Observed -
Template Spectrum Av = -1.3355141
Galaxy
SN/Gal = 0.224975
Mg II, I
[O II]
Ca II
1.5
1.0
0.5
0.0
-0.5
6000
7000
8000
9000

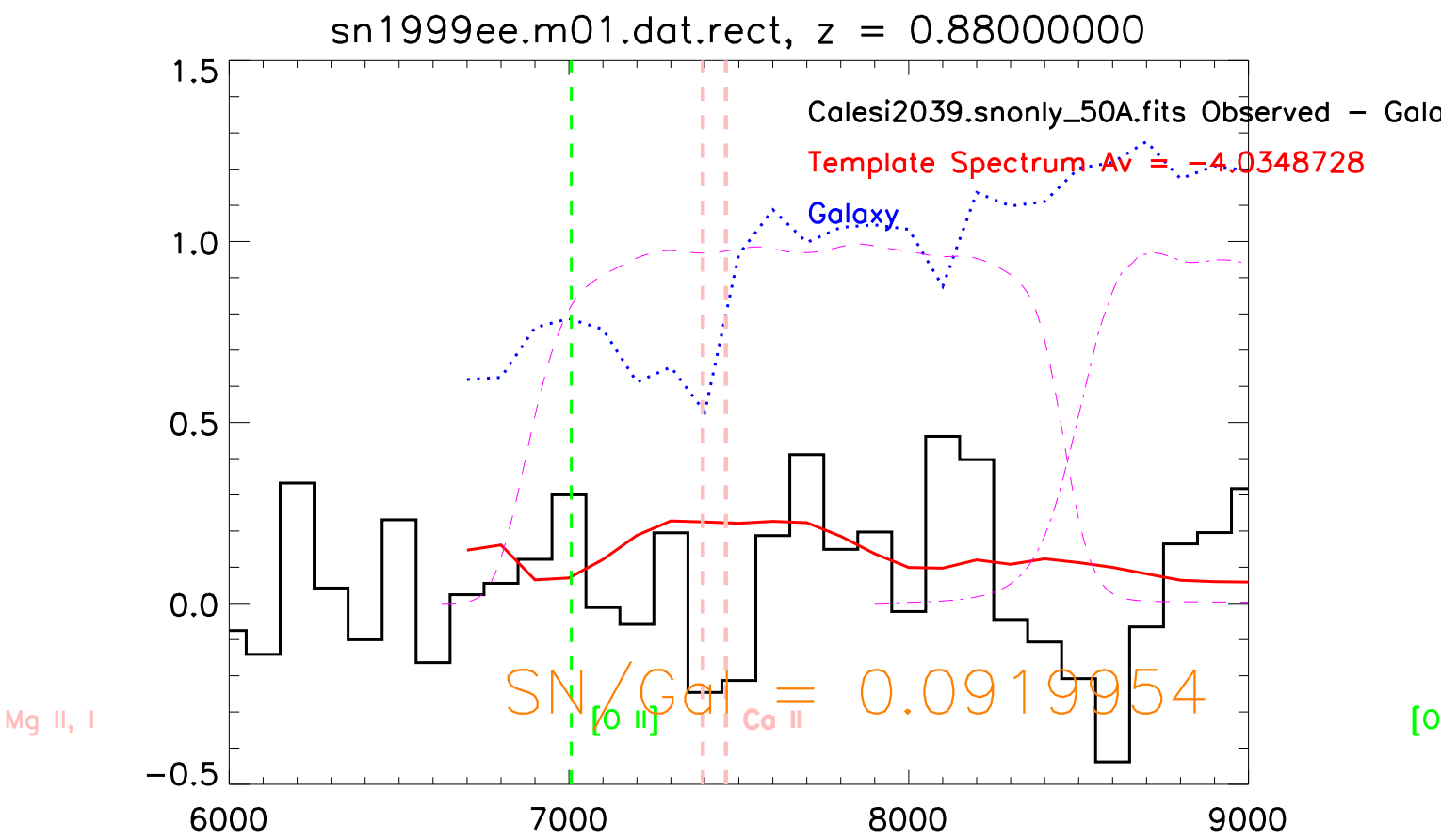

sn1989b.m07.dat.rect, z = 0.96000004
Calesi2039.snonly_50A.fits Observed – Galaxy
Template Spectrum, Av = 1.5582015
Galaxy
SN/Gal = 0.980042
[O II]
Mg II, I
Ca II
1.0
0.8
0.6
0.4
0.2
0.0
6000
7000
8000
9000

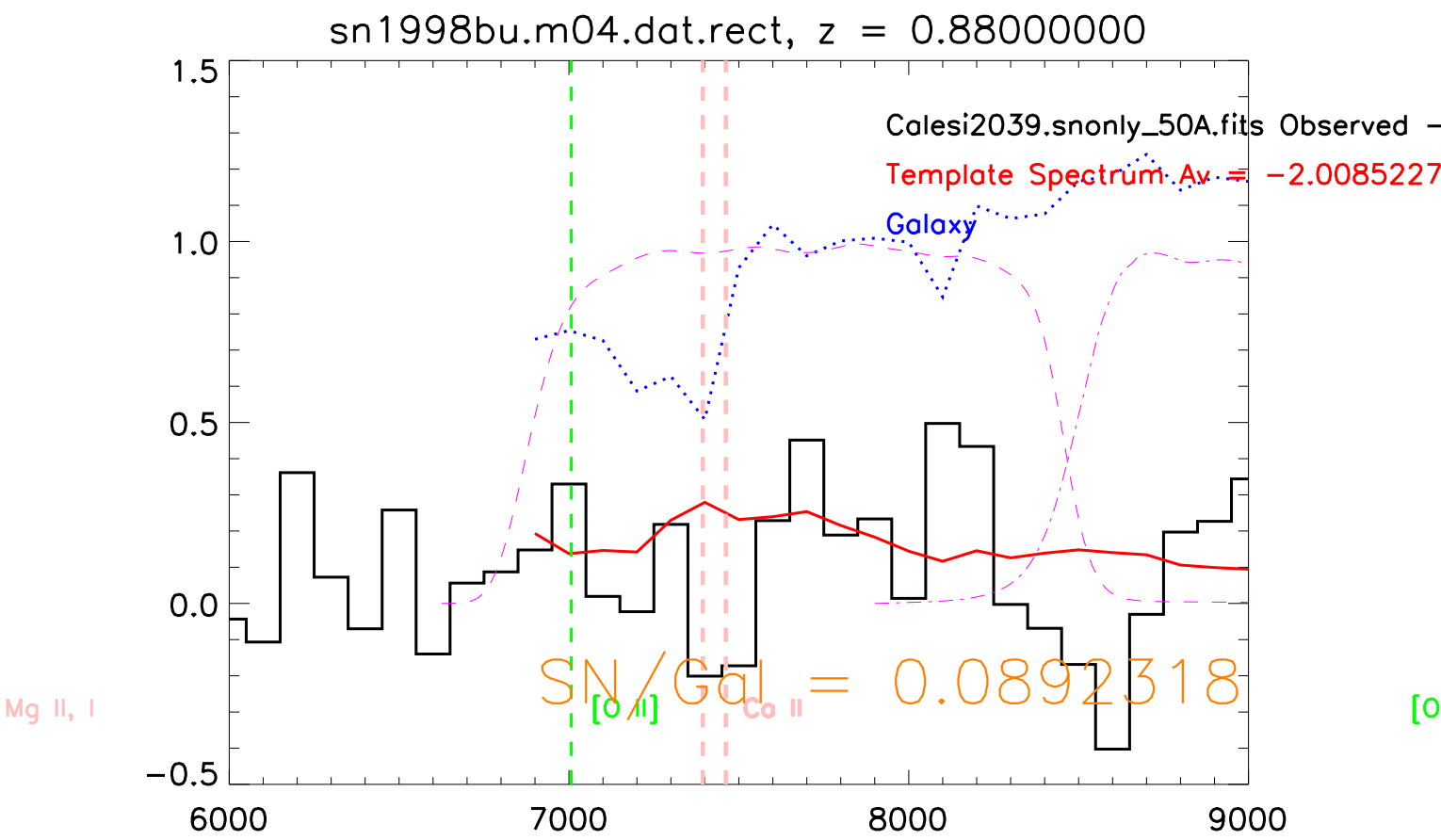

sn1994d.m09.dat.rect, z = 0.94999999
Calesi2039.snonly_50A.fits Observed – G
Template Spectrum Av = 1.9997985
Galaxy
SN/Gal = 0.159693
Mg II, I
[O II]
Ca II
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000

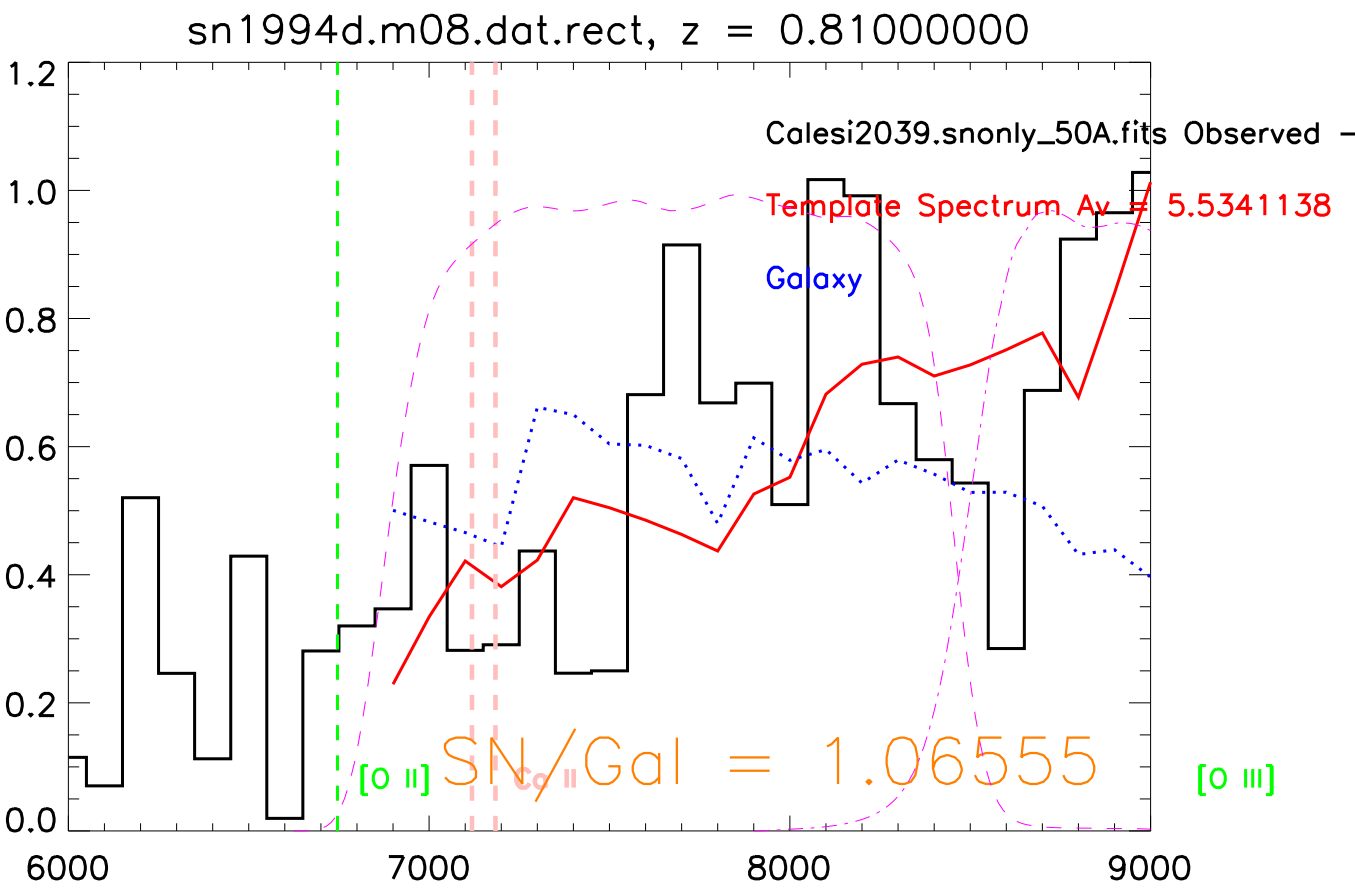

sn1990n.m14.dat.rect, z = 0.97000003
Calesi2039.snonly_50A.fits Observed − Galaxy
Template Spectrum Av = 1.7128587
Galaxy
SN/Gal = 0.761804
Mg II, I
[O II]
Ca II
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000


sn1992a.p03.dat.rect, z = 0.93000001
Calesi2039.snonly_50A.fits Observed -
Template Spectrum Av = 0.66575721
Galaxy
SN/Gal = 0.665997
Mg II, I
[O II]
Ca II
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
6000
7000
8000
9000


sn1992a.m01.dat.rect, z = 0.92000002
Calesi2039.snonly_50A.fits Observed -
Template Spectrum Av = -4.2708317
Galaxy
SN/Gal = -0.0562741
Mg II, I
[O II]
Ca II
1.5
1.0
0.5
0.0
-0.5
6000
7000
8000
9000


sn1999ee.m01.dat.rect, z = 0.88000000
Calesi2039.snonly_50A.fits Observed – Gala
Template Spectrum Av = –4.0348728
Galaxy
SN/Gal = 0.09199954
Mg II, I
[O II]
Ca II
[O
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000


sn1998bu.m04.dat.rect, z = 0.88000000
Calesi2039.snonly_50A.fits Observed -
Template Spectrum Av = -2.0085227
Galaxy
SN/Gal = 0.0892318
Mg II, I
[O II]
Ca II
[O
1.5
1.0
0.5
0.0
−0.5
6000
7000
8000
9000


sn1994d.m08.dat.rect, z = 0.81000000
Calesi2039.snonly_50A.fits Observed –
Template Spectrum Av = 5.5341138
Galaxy
SN/Gal = 1.06555
[O II]
Ca II
[O III]
1.2
1.0
0.8
0.6
0.4
0.2
0.0
6000
7000
8000
9000