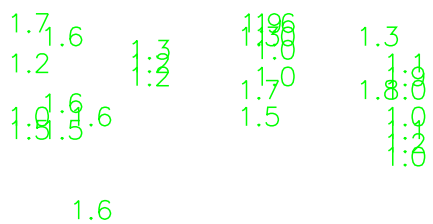
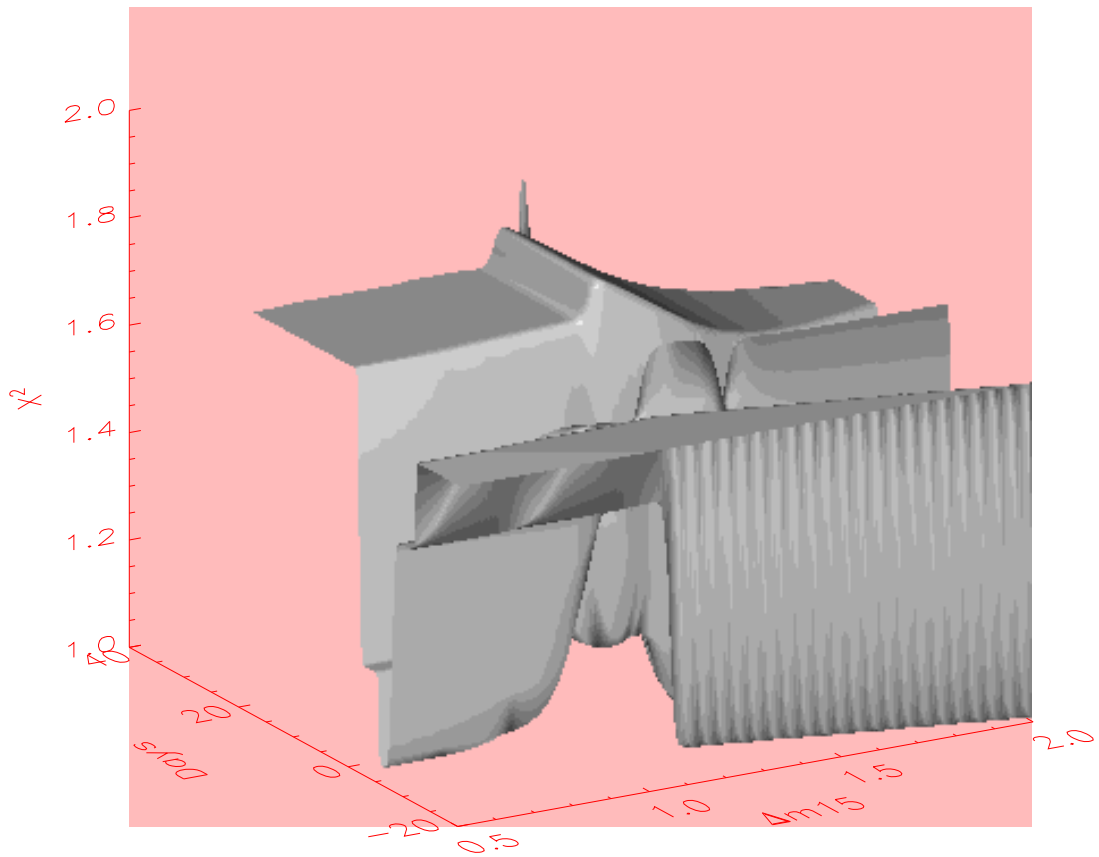
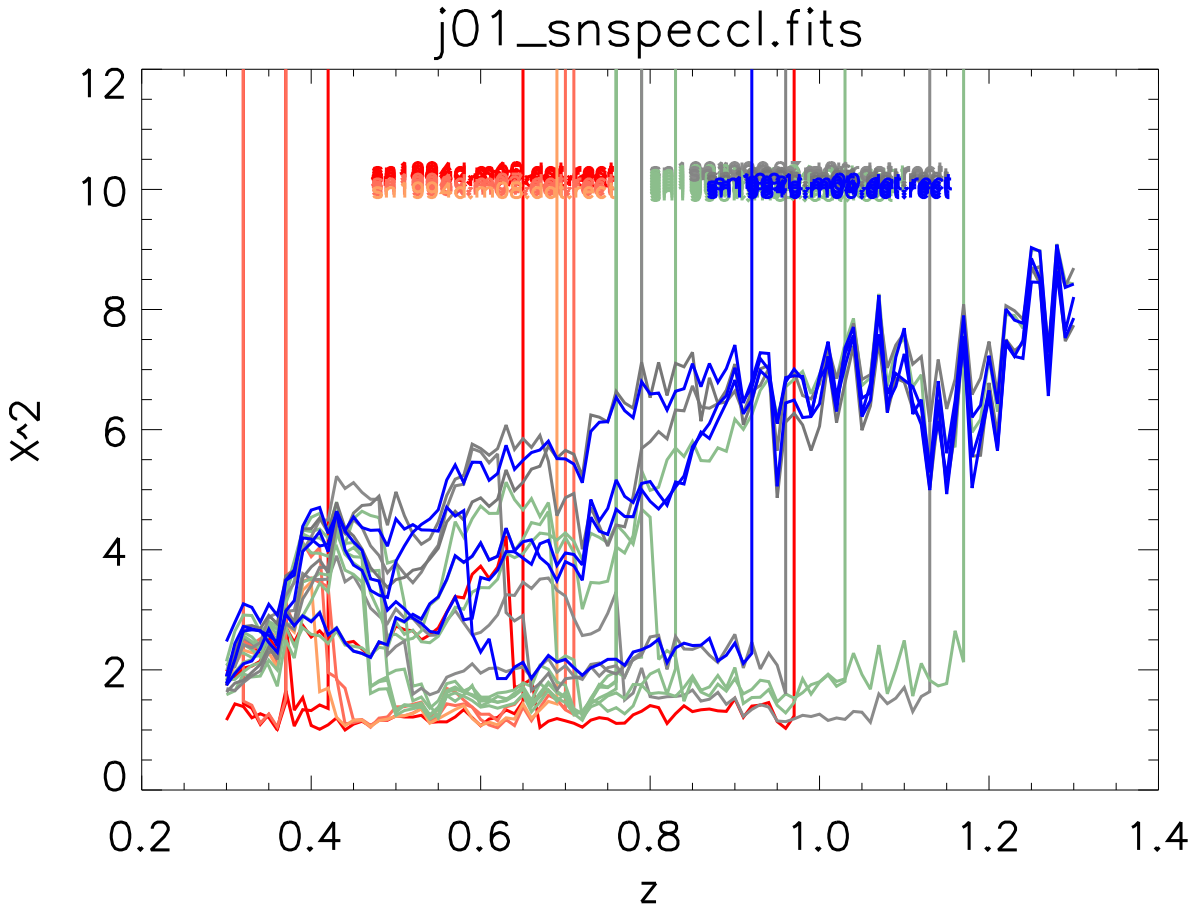
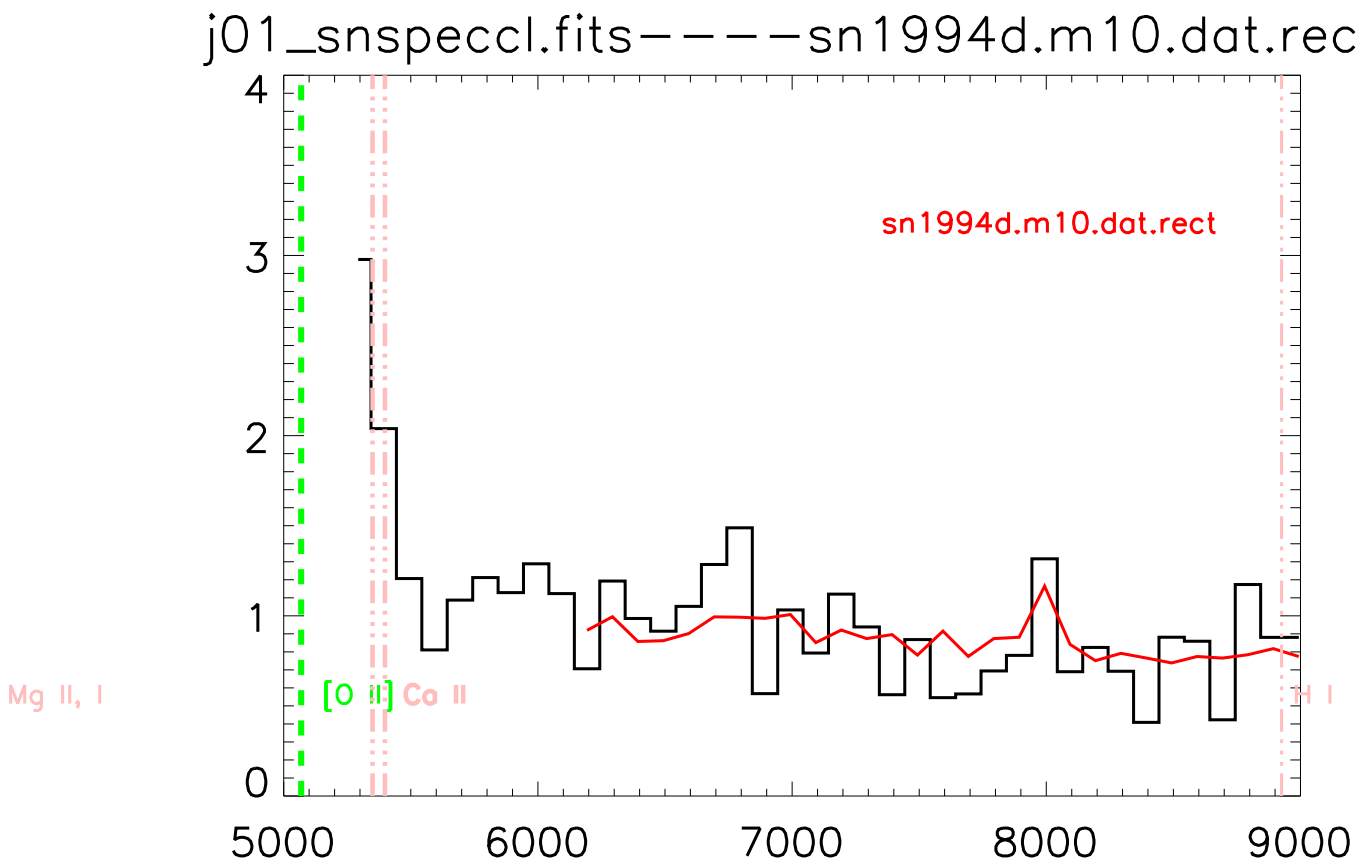
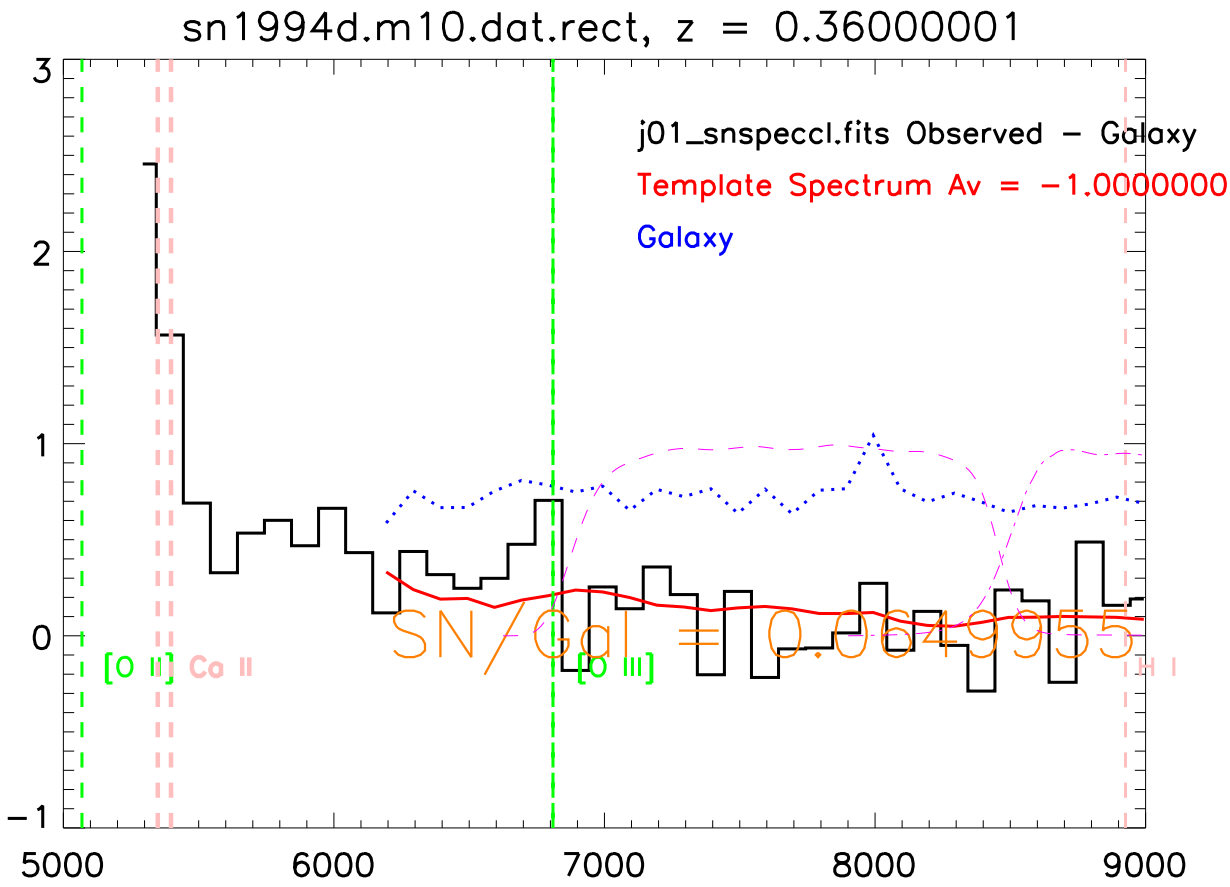
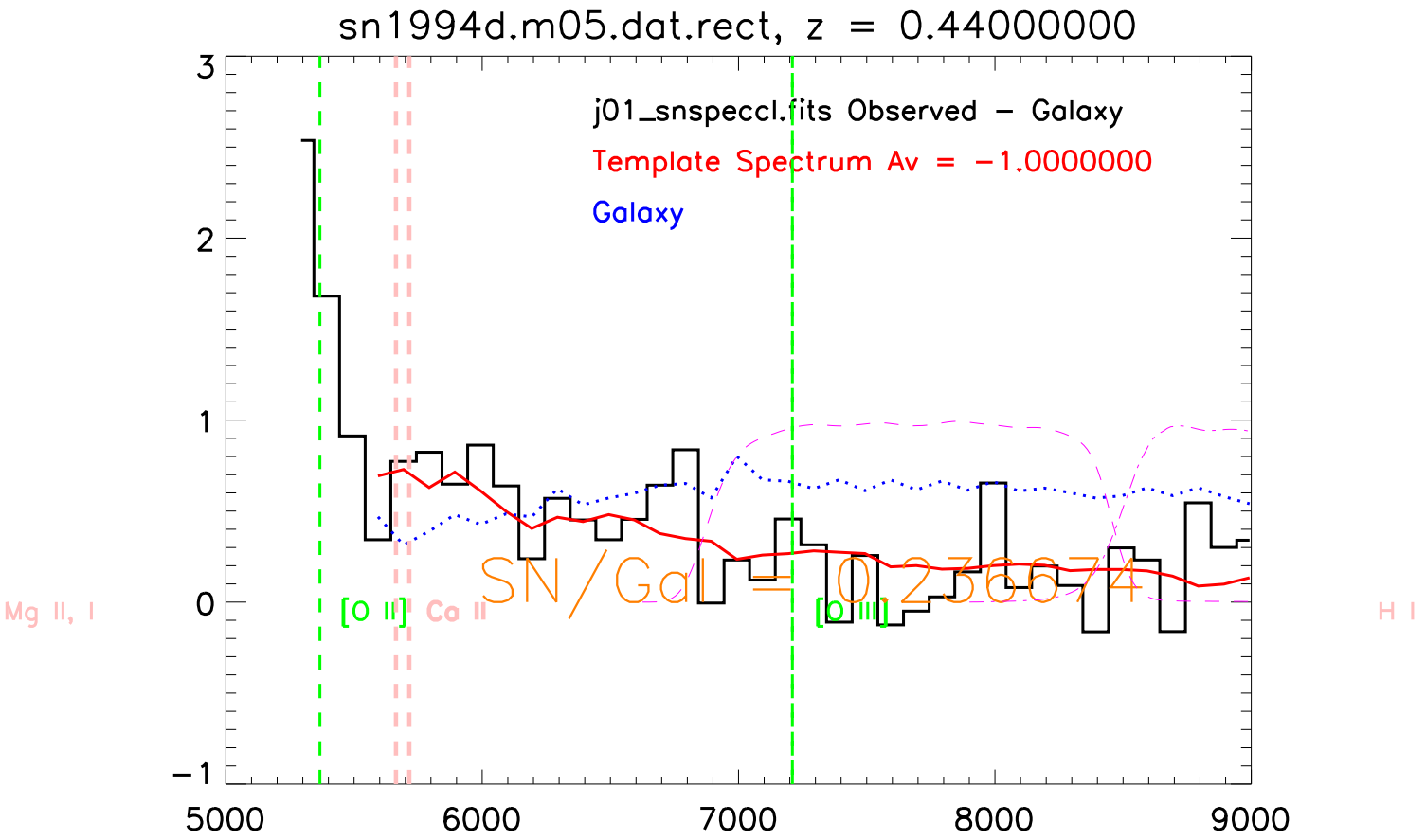


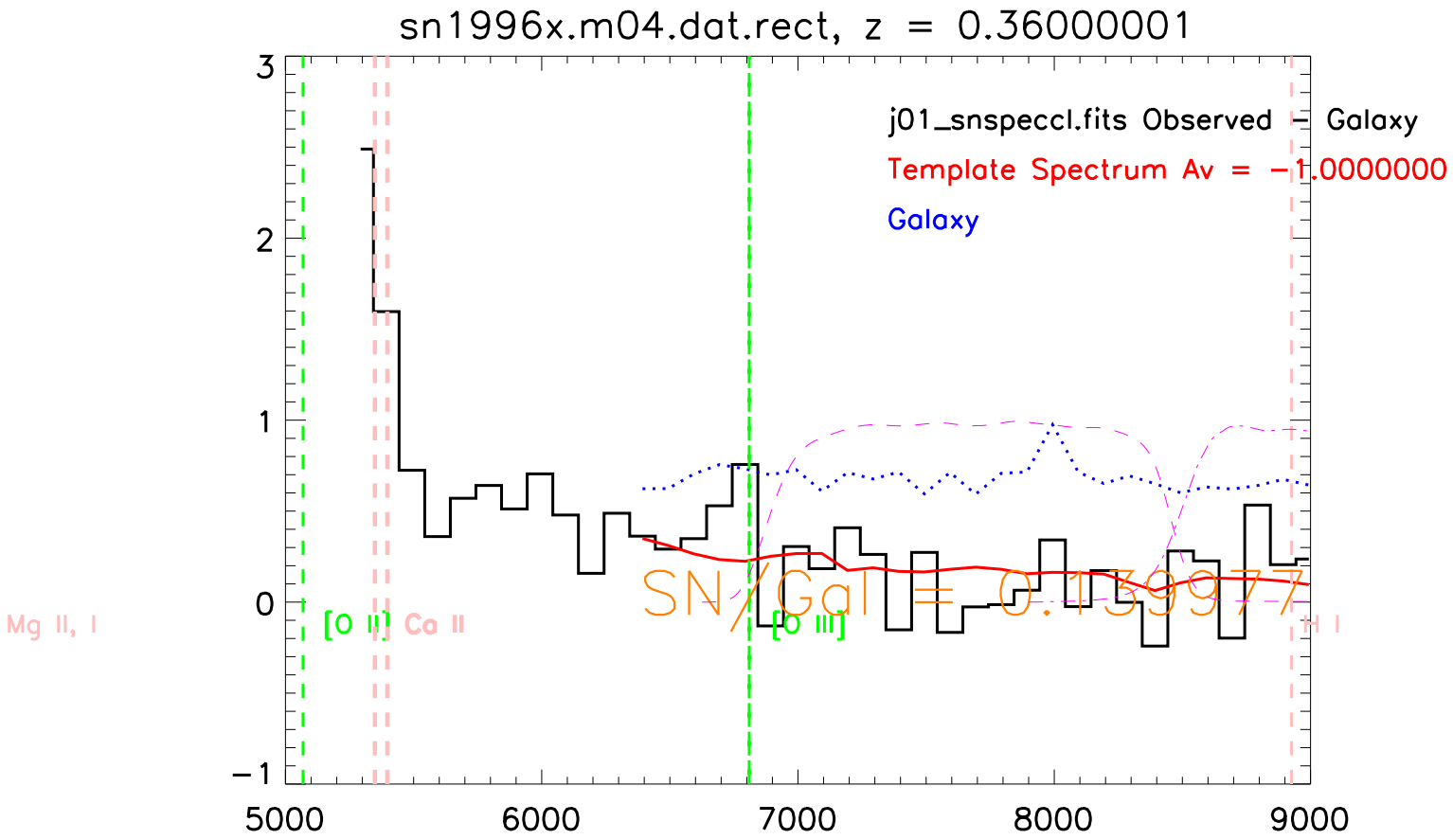

2.0
1.8
1.6
1.4
1.2
1.0
χ²
40
20
0
−20
Dφ/s
0.5
1.0
1.5
2.0
Δm15

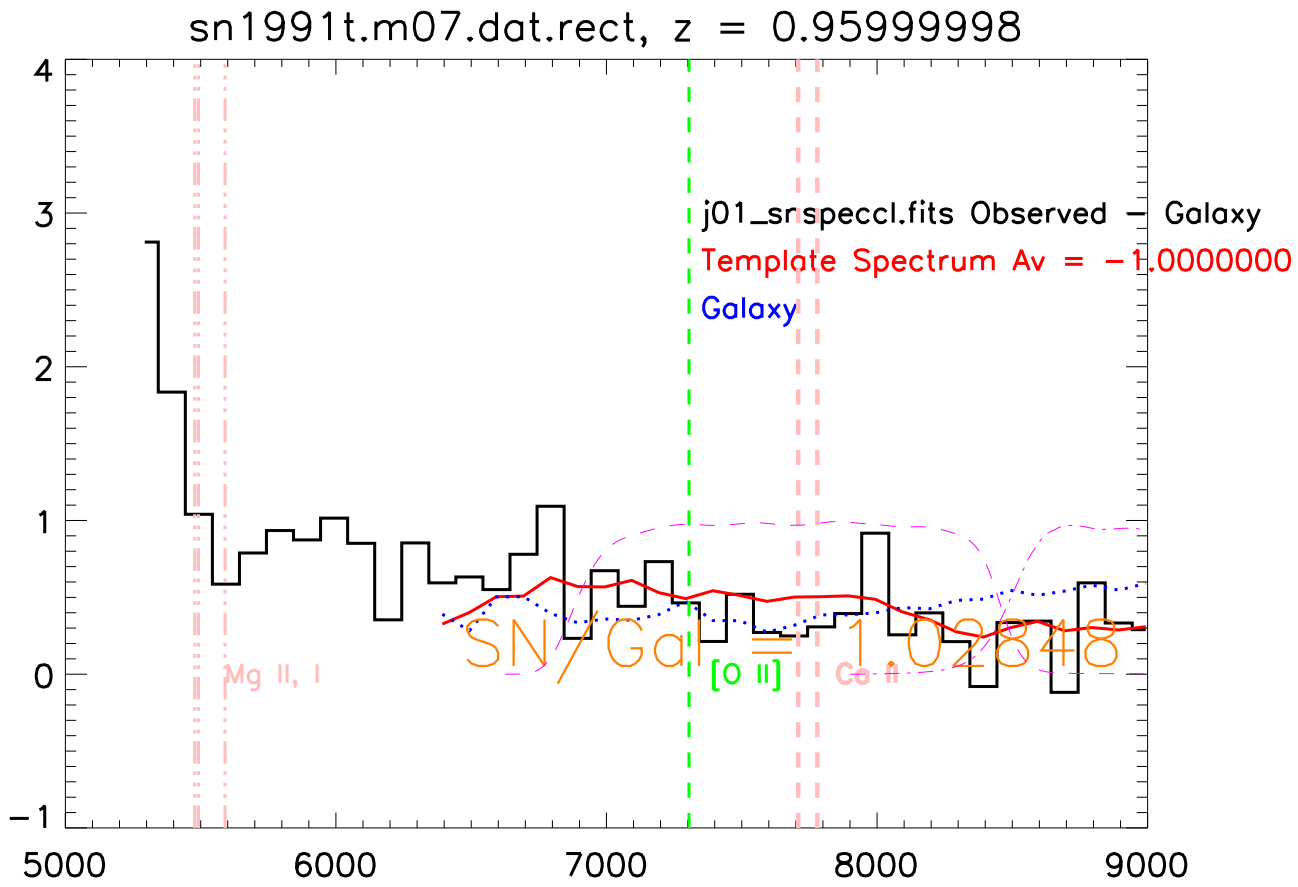

j01_snspeccl.fits
X^2
z
0
2
4
6
8
10
12
0.2
0.4
0.6
0.8
1.0
1.2
1.4


j01_snspeccl.fits----sn1994d.m10.dat.rect
sn1994d.m10.dat.rect
Mg II, I
[O II]
Ca II
H I
0
1
2
3
4
5000
6000
7000
8000
9000

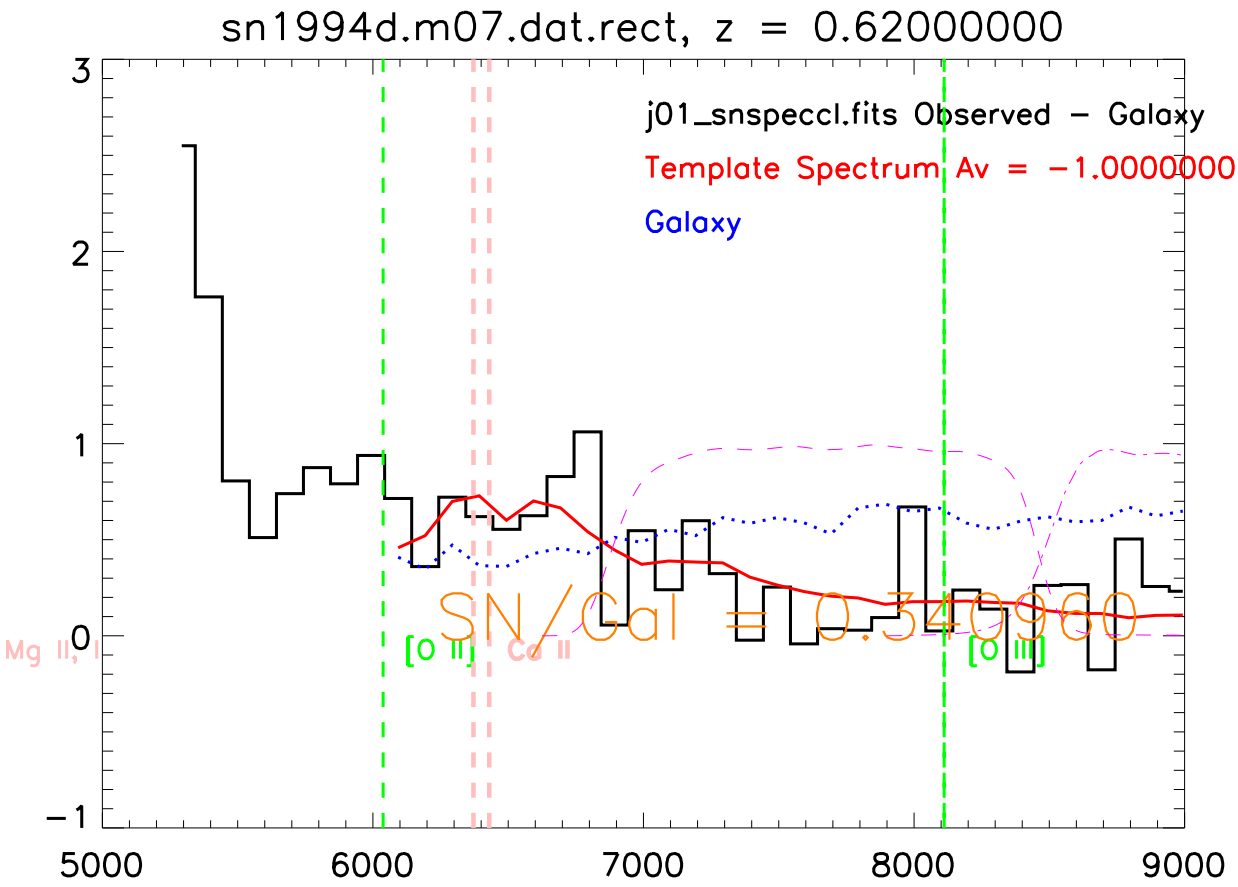

sn1994d.m10.dat.rect, z = 0.36000001
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.0649955
Mg II, I
[O II]
Ca II
[O III]
H I
3
2
1
0
−1
5000
6000
7000
8000
9000

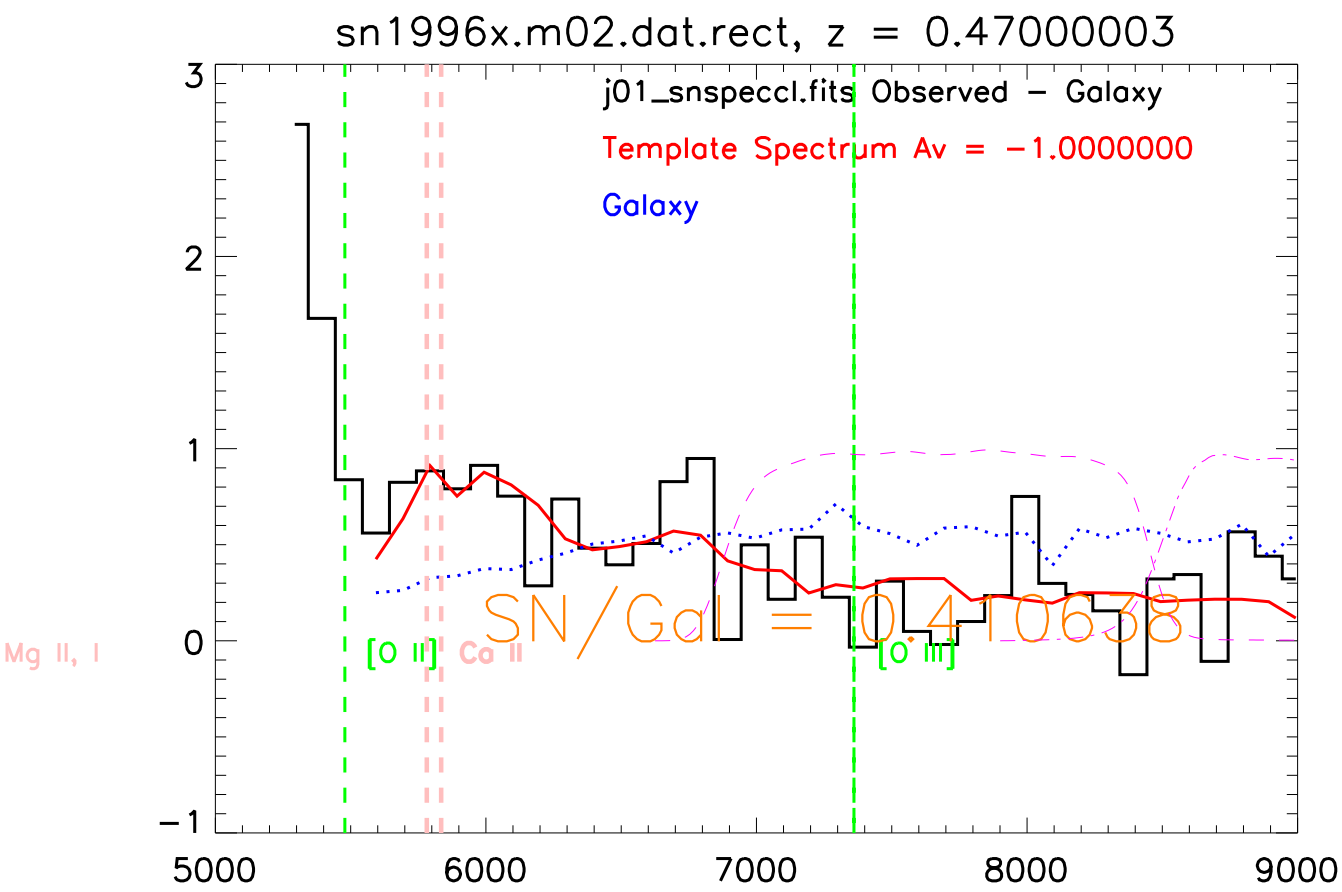

sn1994d.m05.dat.rect, z = 0.44000000
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.23666674
Mg II, I
[O II]
Ca II
[O III]
H I
3
2
1
0
−1
5000
6000
7000
8000
9000

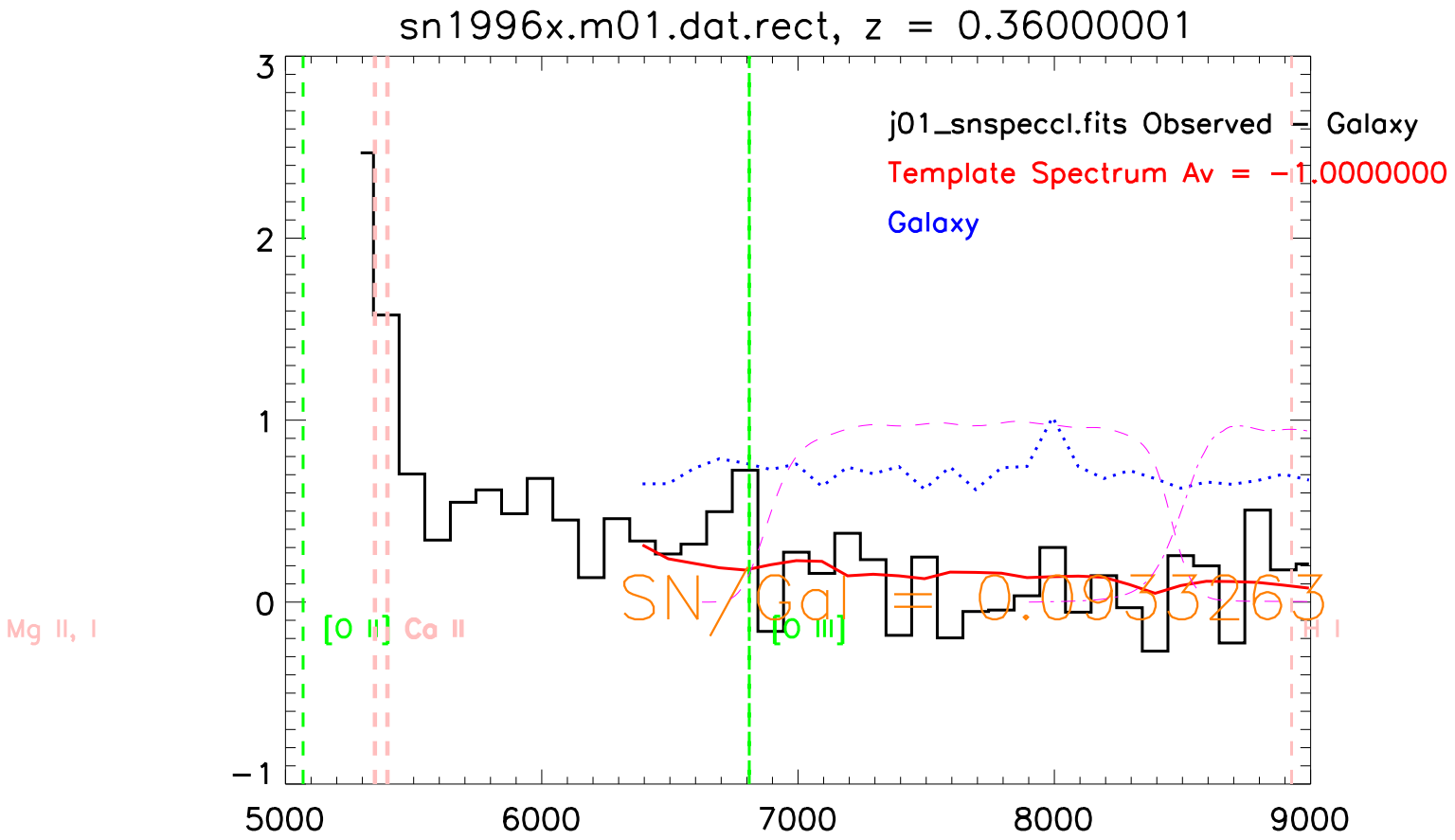

sn1996x.m04.dat.rect, z = 0.36000001
j01_snspeccl.fits Observed
Galaxy
Template Spectrum Av = -1.0000000
Galaxy
SN/Gal = 0.113997
Mg II, I
[O II]
Ca II
[O III]
H I
3
2
1
0
-1
5000
6000
7000
8000
9000

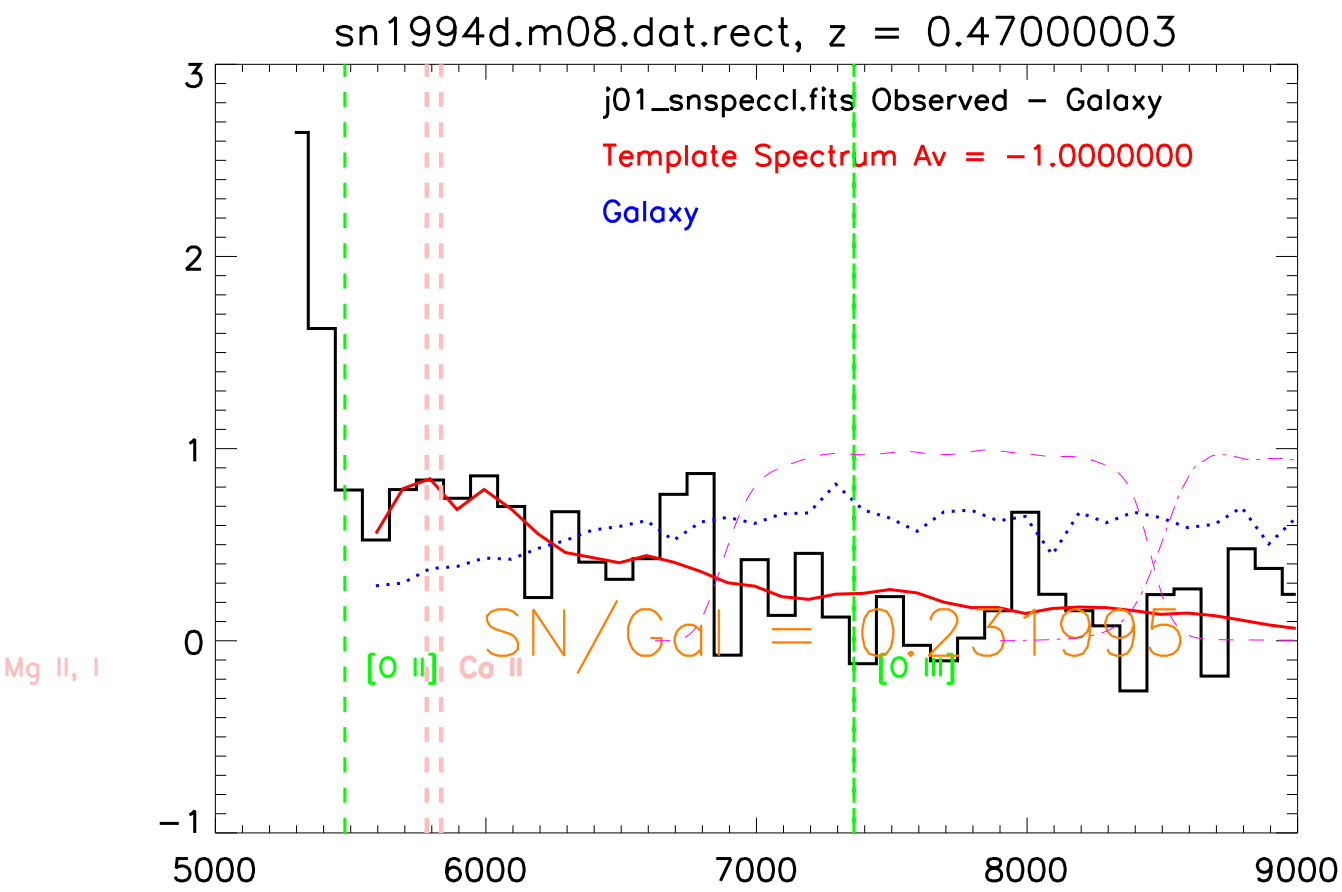


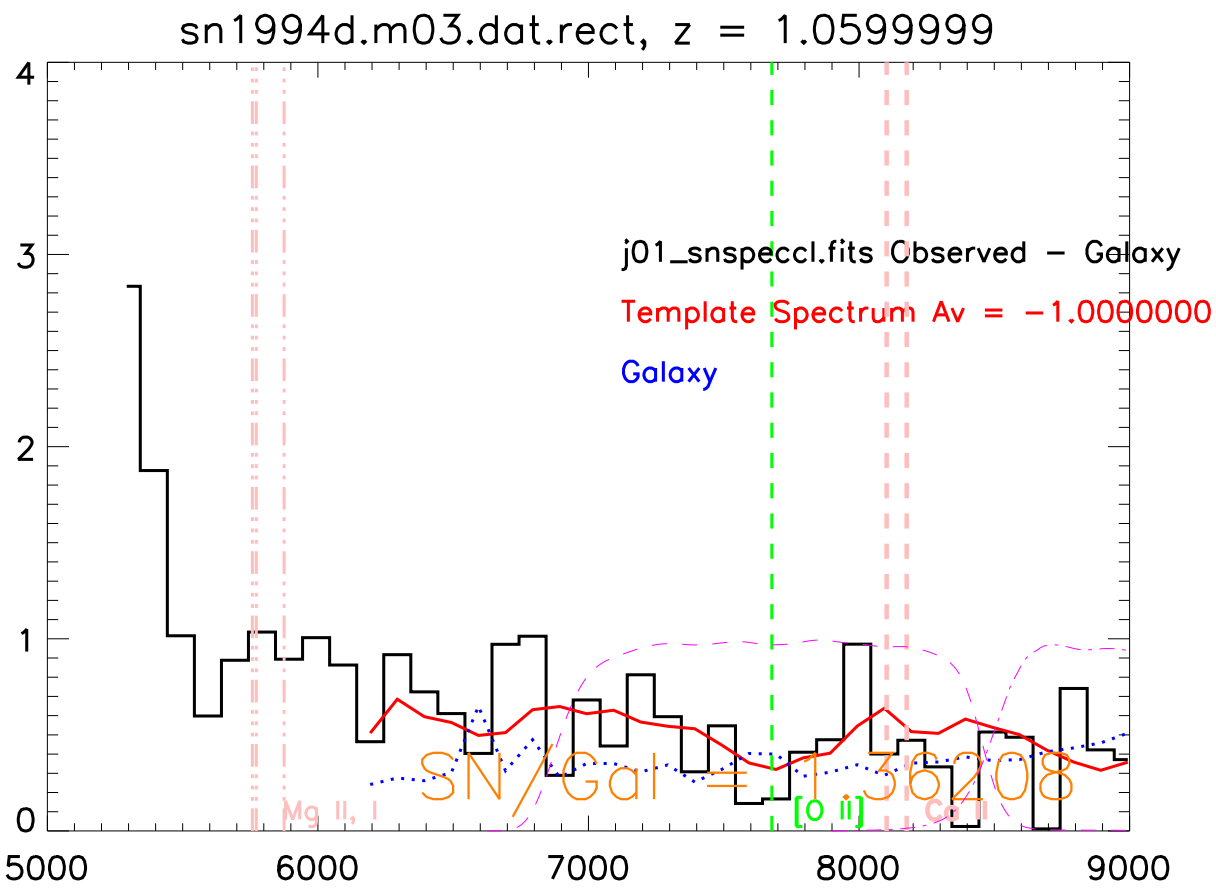
sn1991t.m07.dat.rect, z = 0.95999998
j01_snspeccl.fits Observed – Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 1.02848
Mg II, I
[O II]
Ca II
4
3
2
1
0
−1
5000
6000
7000
8000
9000

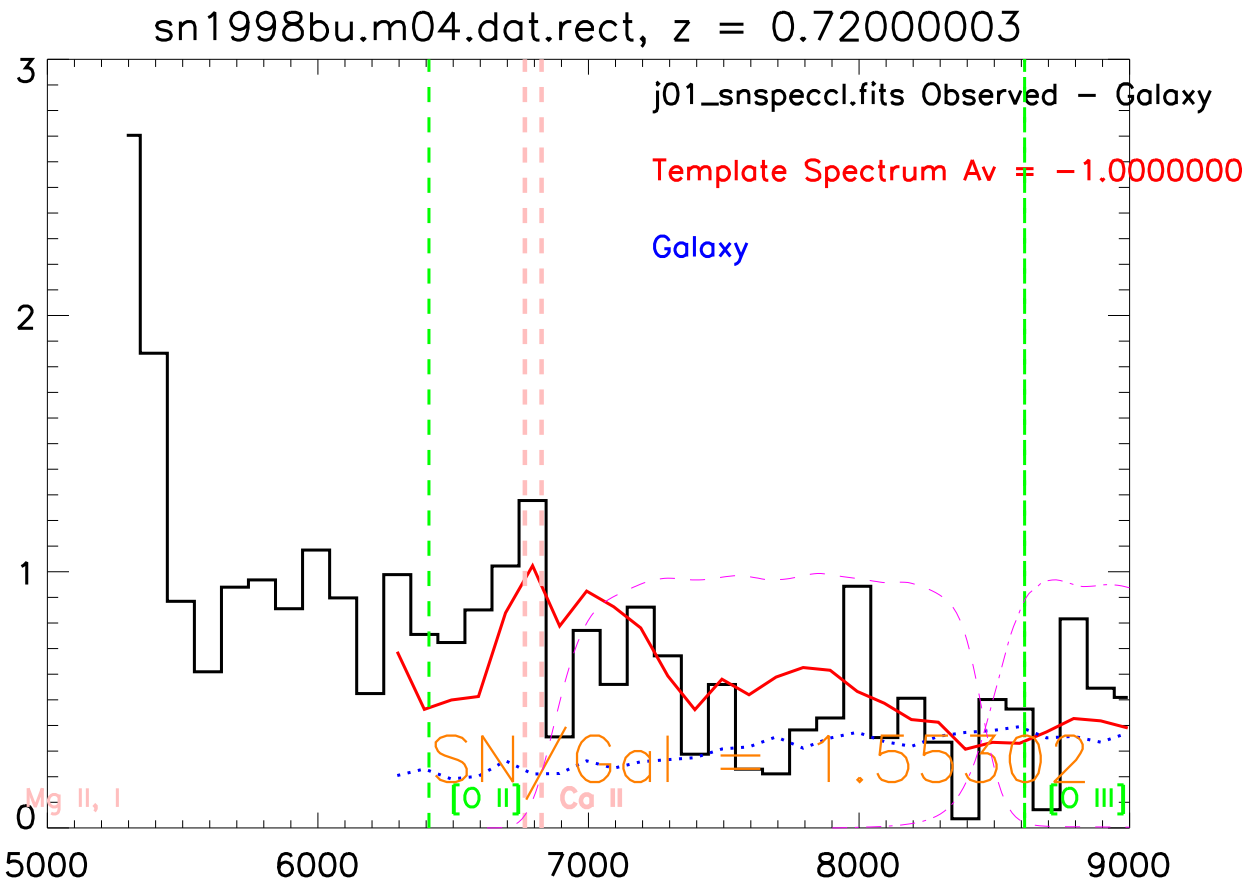

sn1994d.m07.dat.rect, z = 0.62000000
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.340960
[O II]
Ca II
[O III]
Mg II, I
3
2
1
0
−1
5000
6000
7000
8000
9000

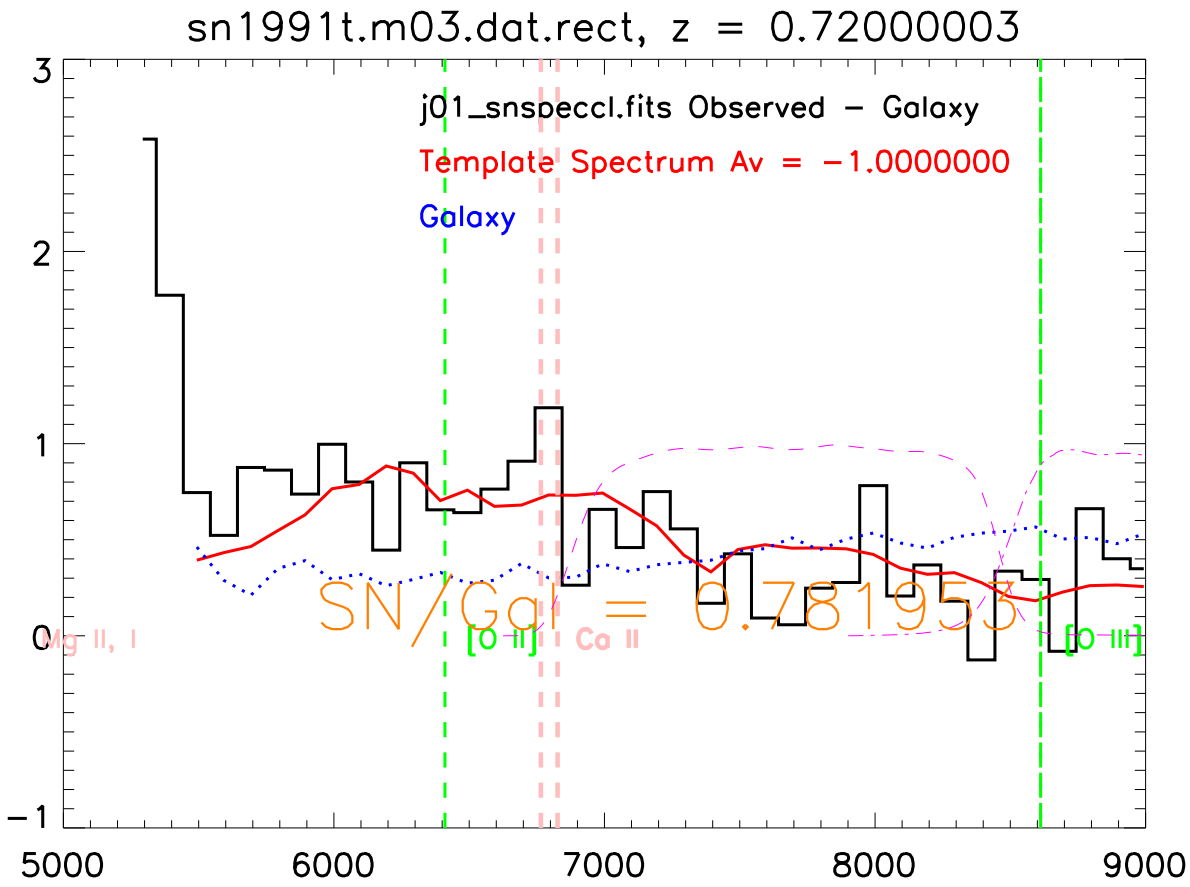

sn1996x.m02.dat.rect, z = 0.47000003
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 014106538
Mg II, I
[O II]
Ca II
[O III]
H
3
2
1
0
−1
5000
6000
7000
8000
9000

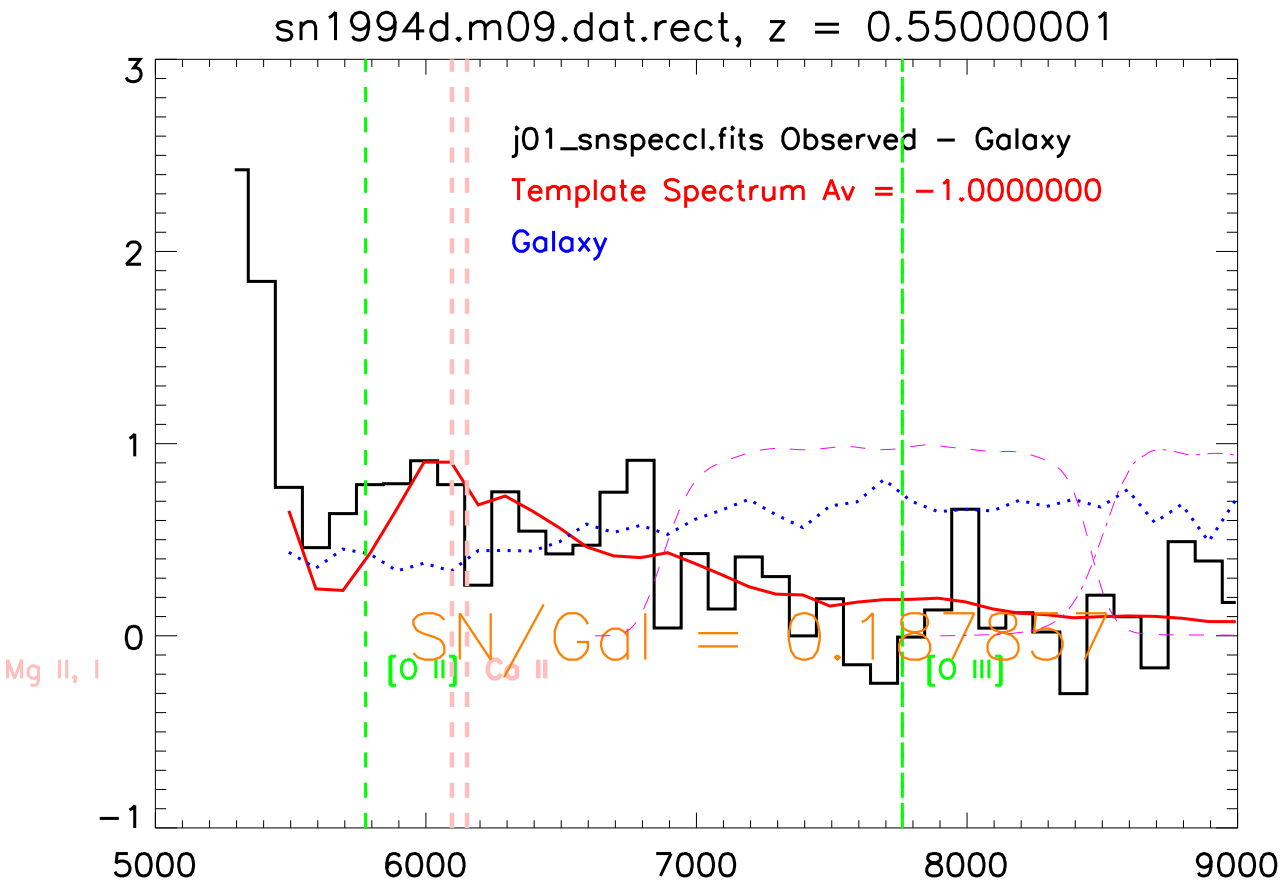

sn1996x.m01.dat.rect, z = 0.36000001
j01_snspeccl.fits Observed
Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.09333263
Mg II, I
[O II]
Ca II
[O III]
H I
3
2
1
0
−1
5000
6000
7000
8000
9000

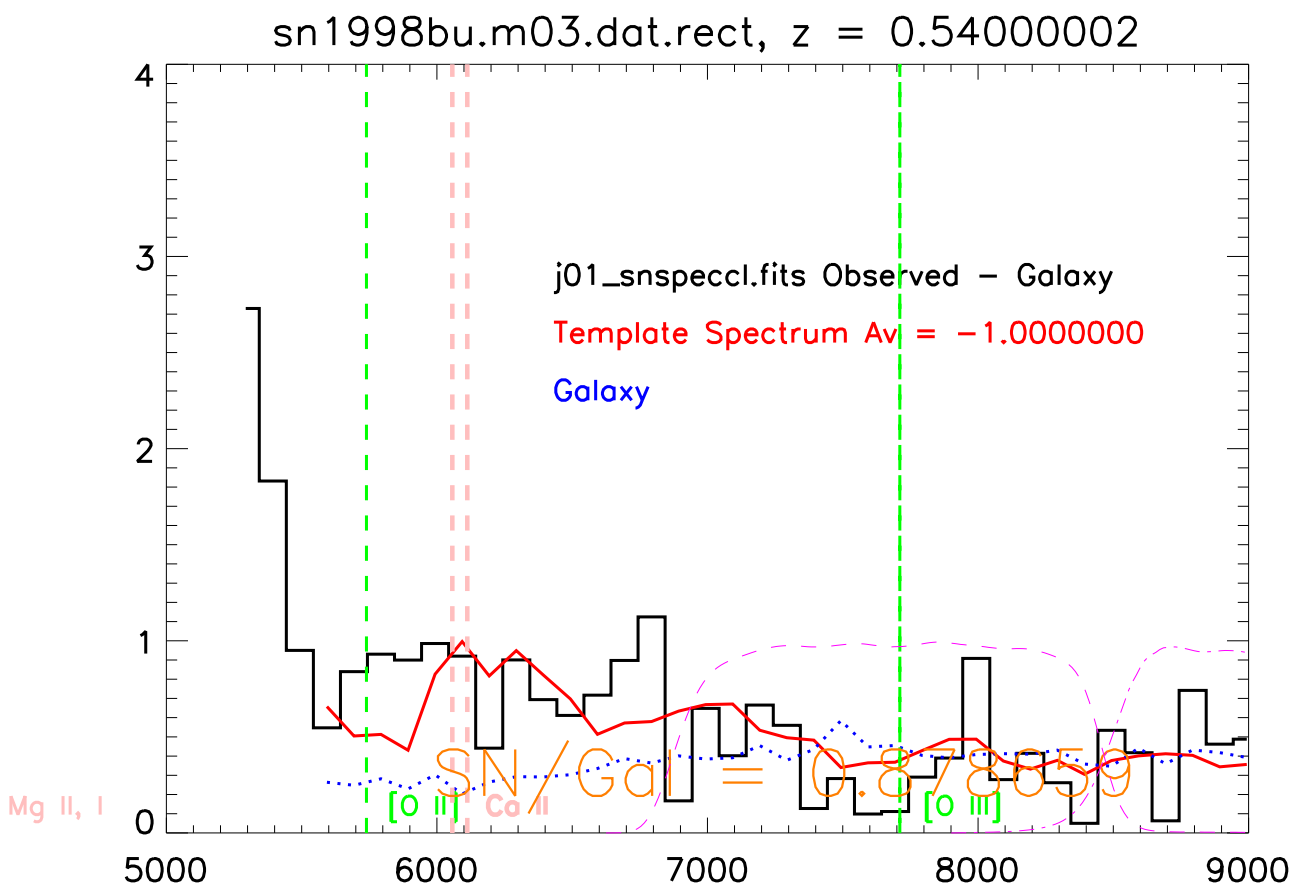

sn1994d.m08.dat.rect, z = 0.47000003
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.231995
[O II]
Ca II
[O III]
Mg II, I
H
3
2
1
0
−1
5000
6000
7000
8000
9000

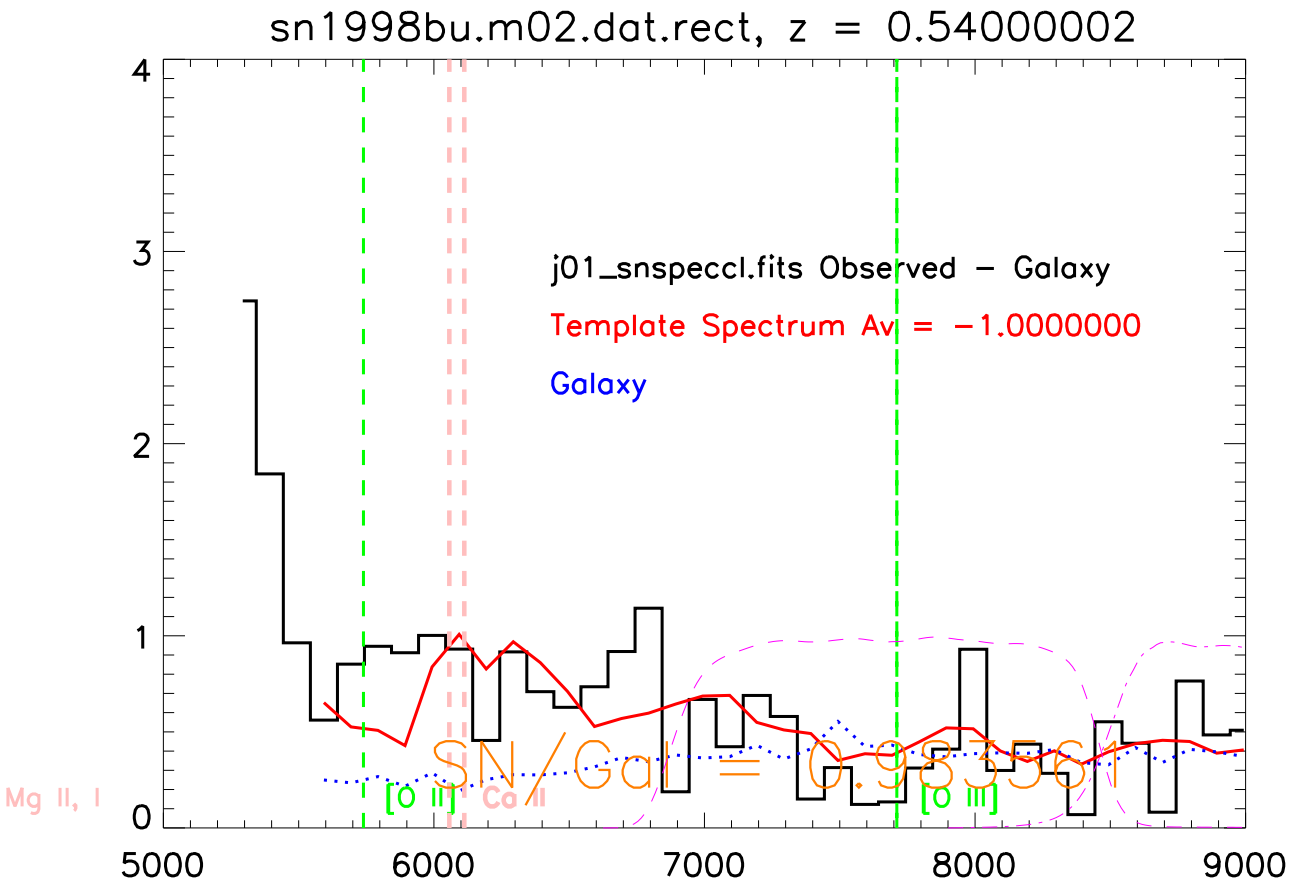

sn1994d.m03.dat.rect, z = 1.0599999
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 1.36208
Mg II, I
[O II]
Ca II
0
1
2
3
4
5000
6000
7000
8000
9000

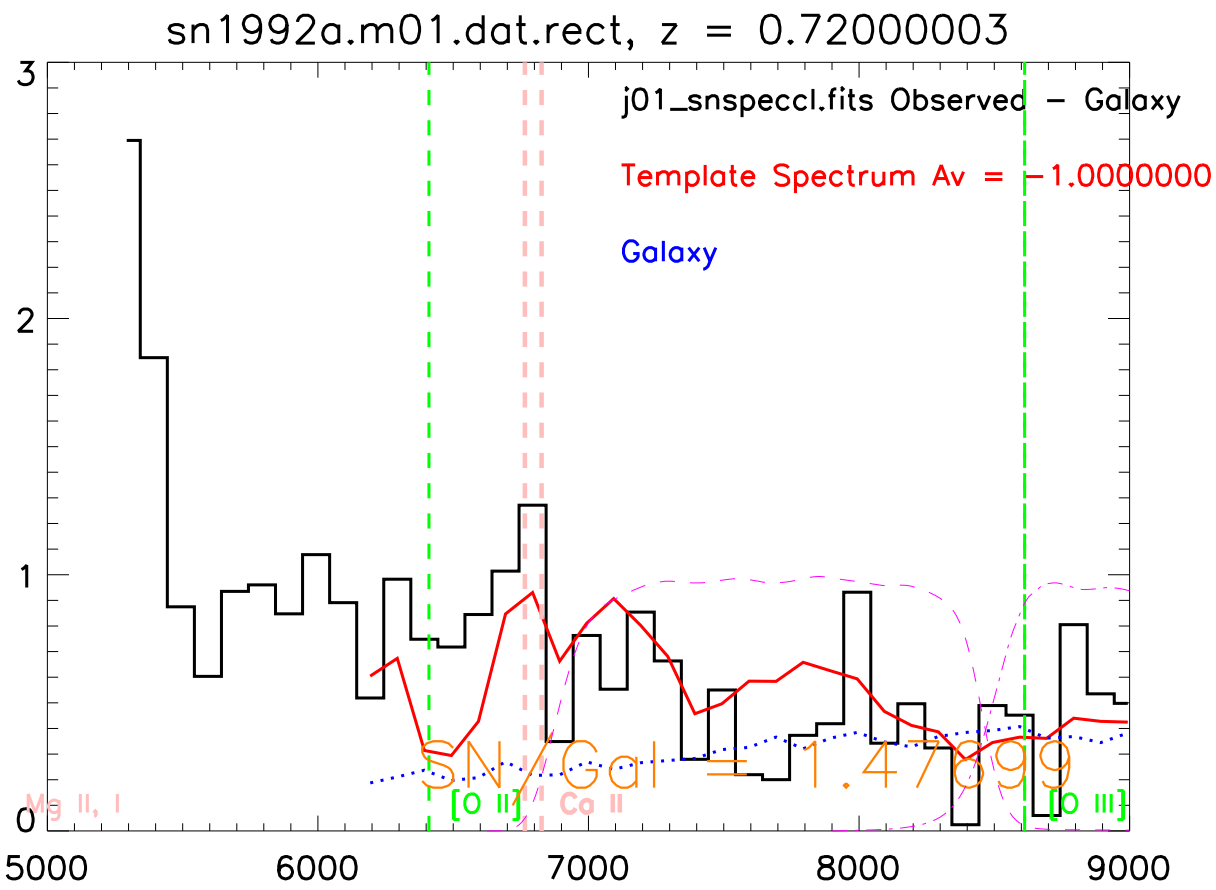

sn1998bu.m04.dat.rect, z = 0.72000003
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 1.55302
Mg II, I
[O II]
Ca II
[O III]
3
2
1
0
5000
6000
7000
8000
9000

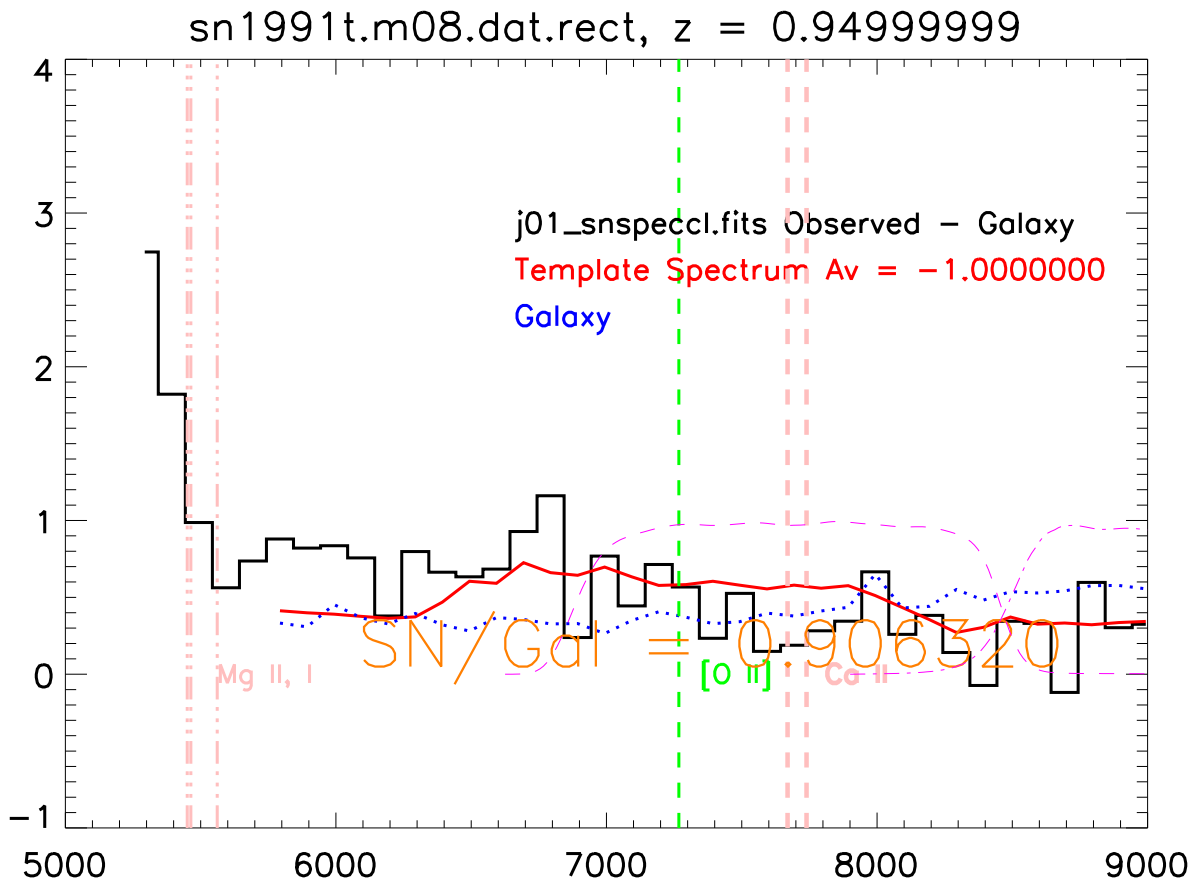

sn1991t.m03.dat.rect, z = 0.72000003
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.7819553
Mg II, I
[O II]
Ca II
[O III]
3
2
1
0
−1
5000
6000
7000
8000
9000

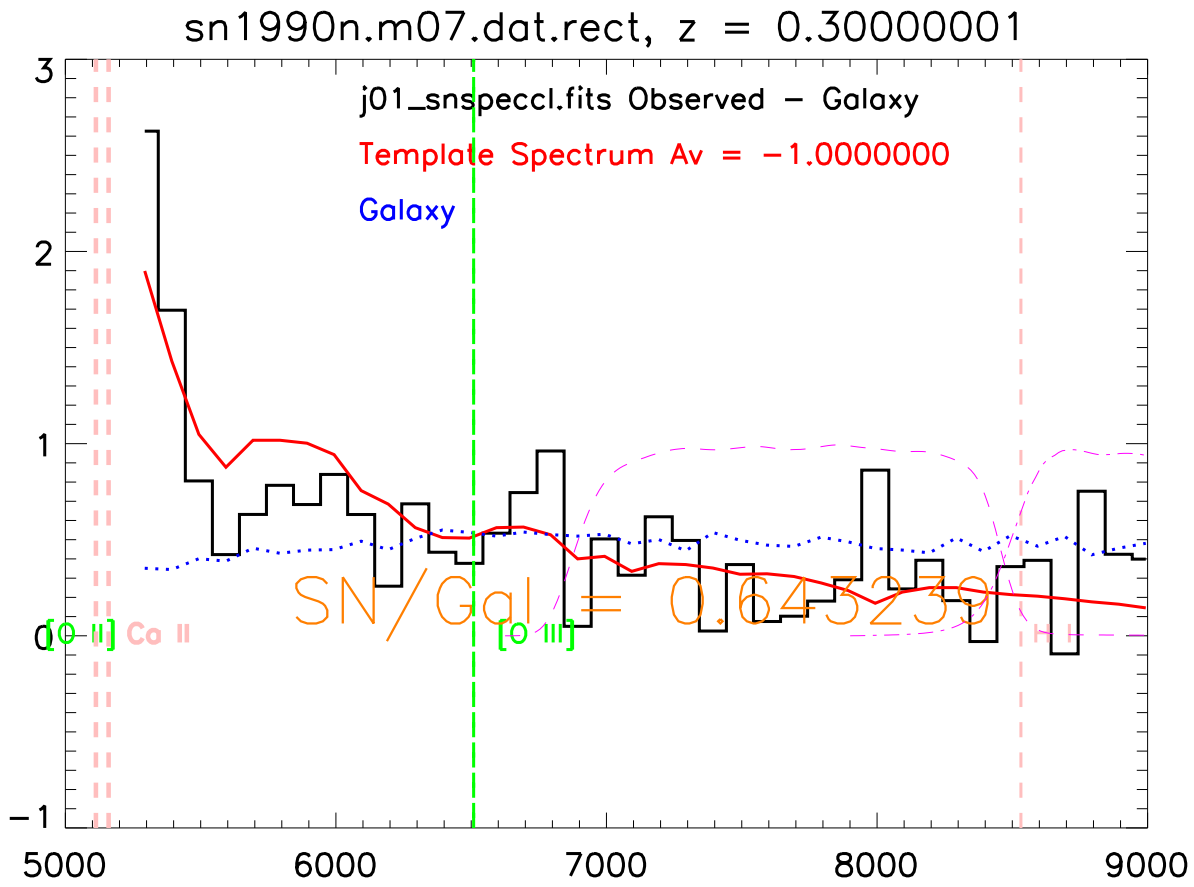

sn1994d.m09.dat.rect, z = 0.55000001
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.1187857
Mg II, I
[O II]
Ca II
[O III]
3
2
1
0
−1
5000
6000
7000
8000
9000


sn1998bu.m03.dat.rect, z = 0.54000002
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.878859
[O II]
Ca II
[O III]
Mg II, I
0
1
2
3
4
5000
6000
7000
8000
9000

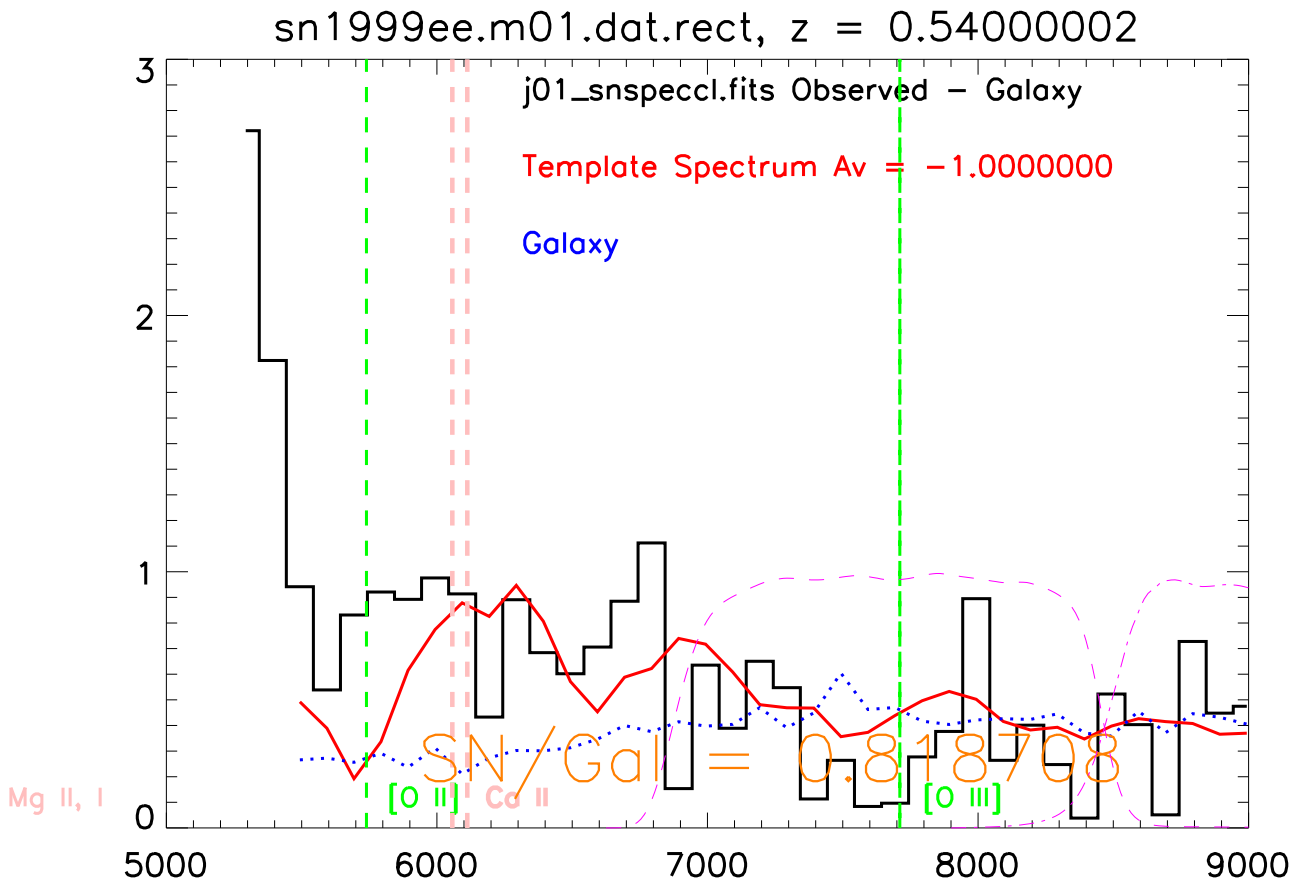

sn1998bu.m02.dat.rect, z = 0.54000002
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.933561
[O II]
Ca II
[O III]
Mg II, I
0
1
2
3
4
5000
6000
7000
8000
9000

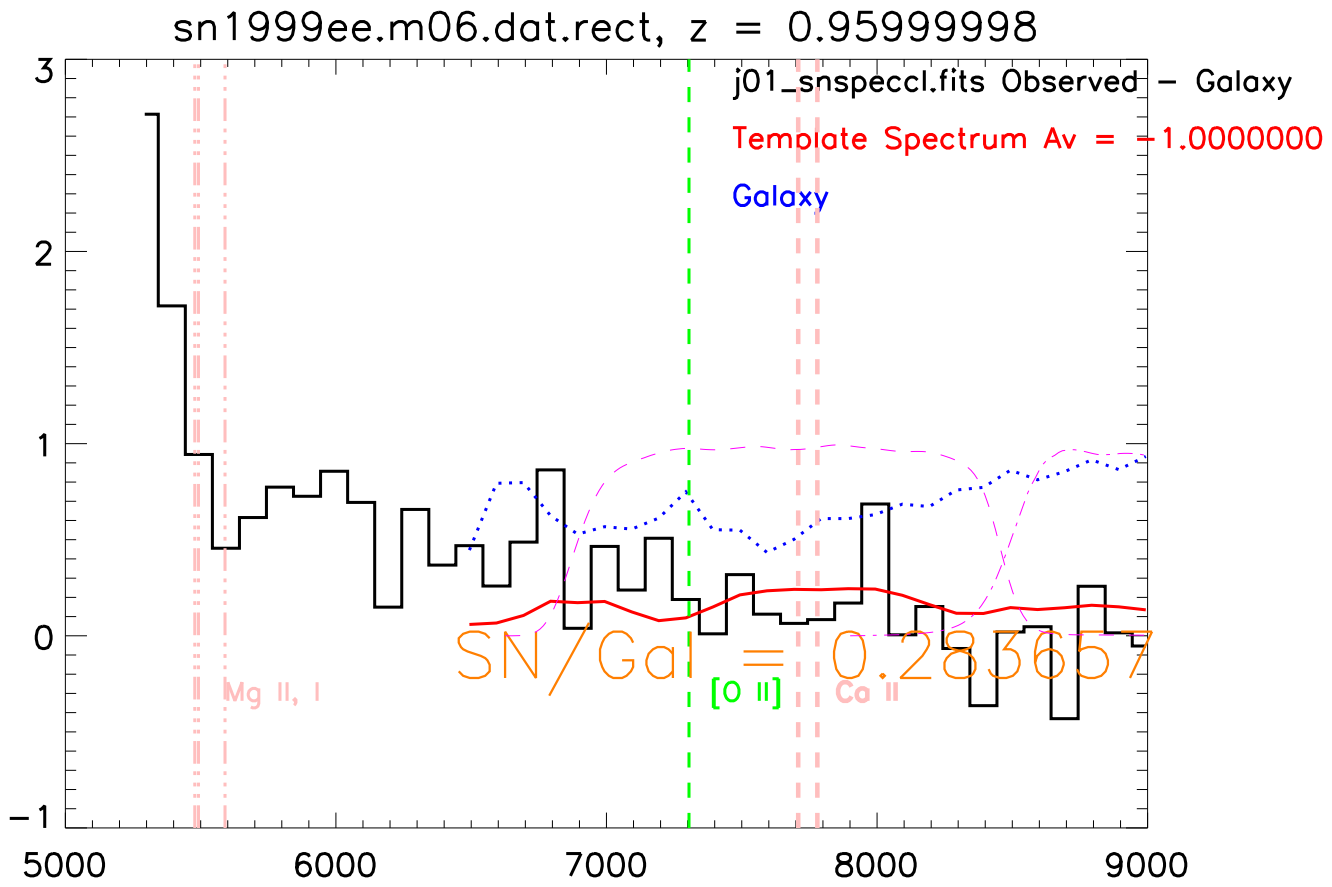

sn1992a.m01.dat.rect, z = 0.72000003
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 1.47899
Mg II, I
[O II]
Ca II
[O III]
0
1
2
3
5000
6000
7000
8000
9000

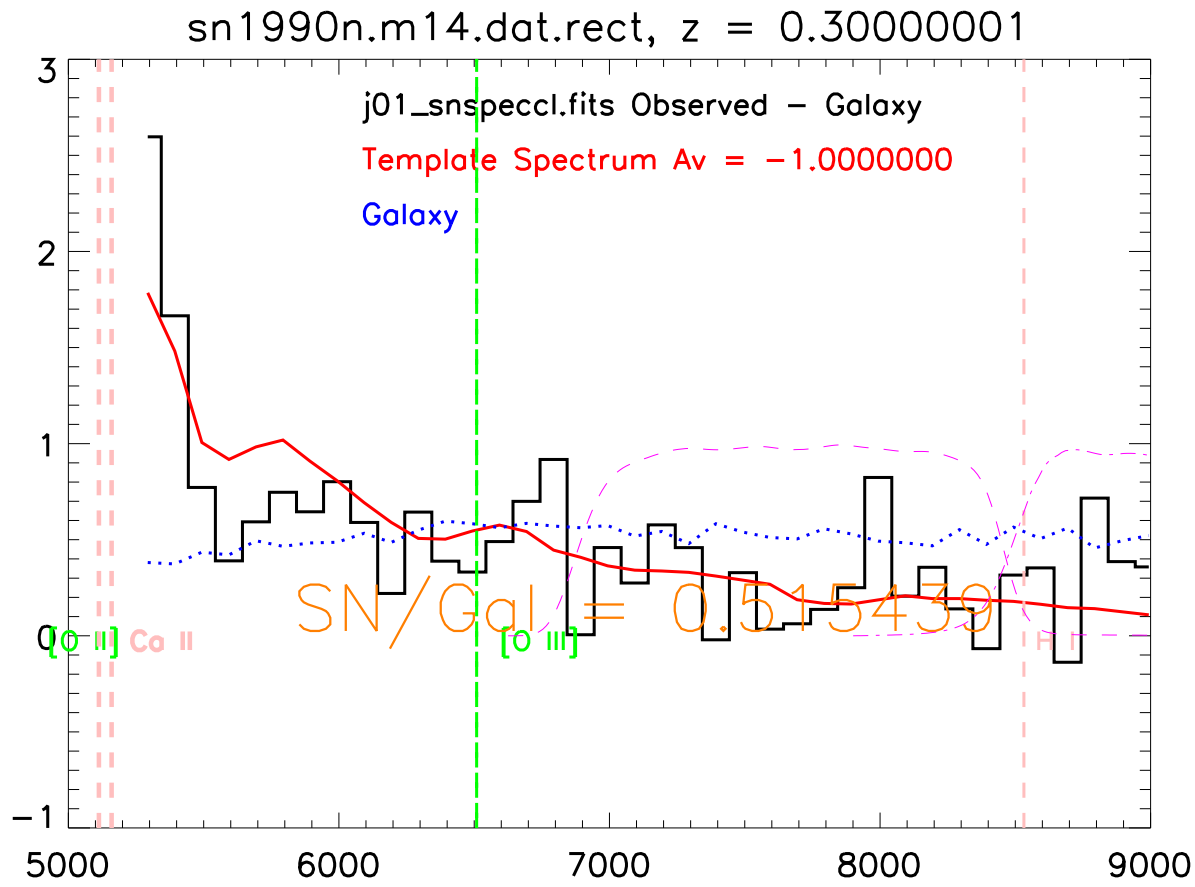

sn1991t.m08.dat.rect, z = 0.94999999
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.906320
Mg II, I
[O II]
Ca II
4
3
2
1
0
−1
5000
6000
7000
8000
9000


sn1990n.m07.dat.rect, z = 0.30000001
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.6453239
[O II]
Ca II
[O III]
H ε
3
2
1
0
−1
5000
6000
7000
8000
9000

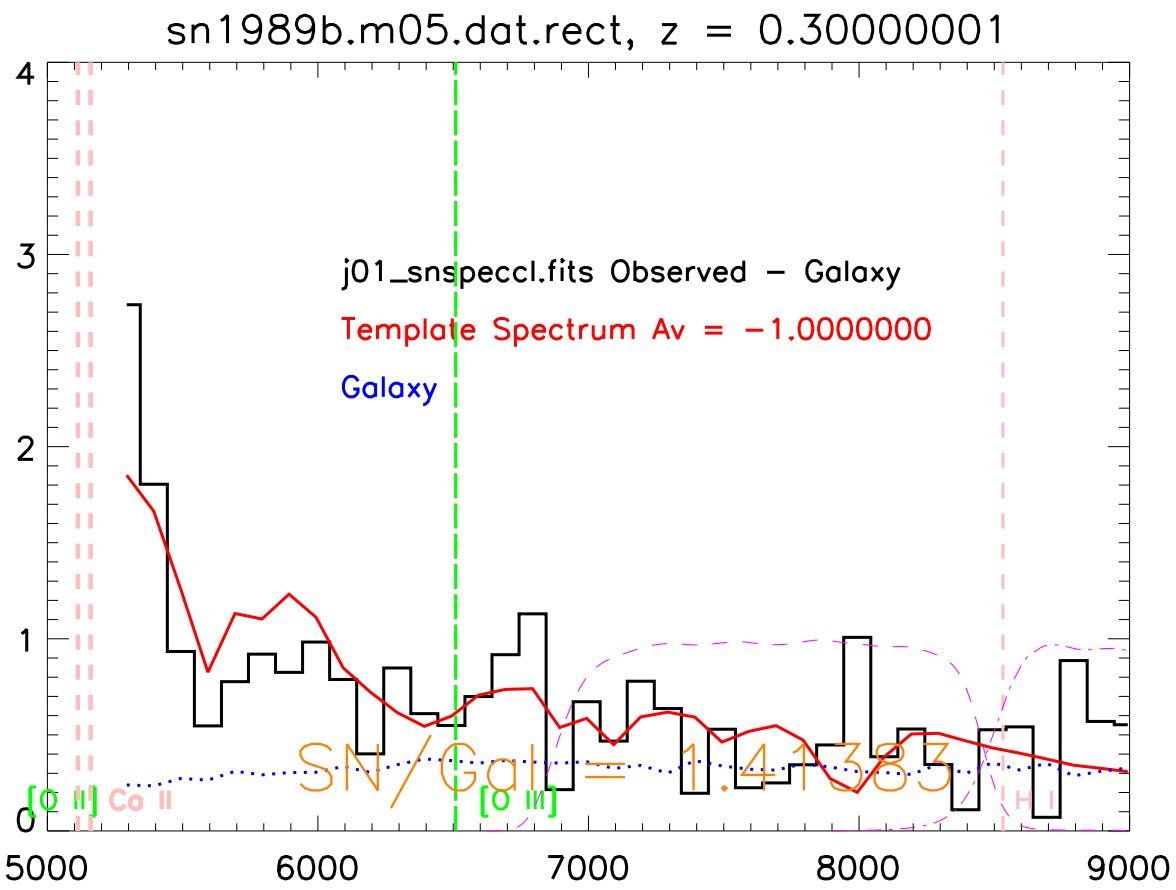
Mg II, I

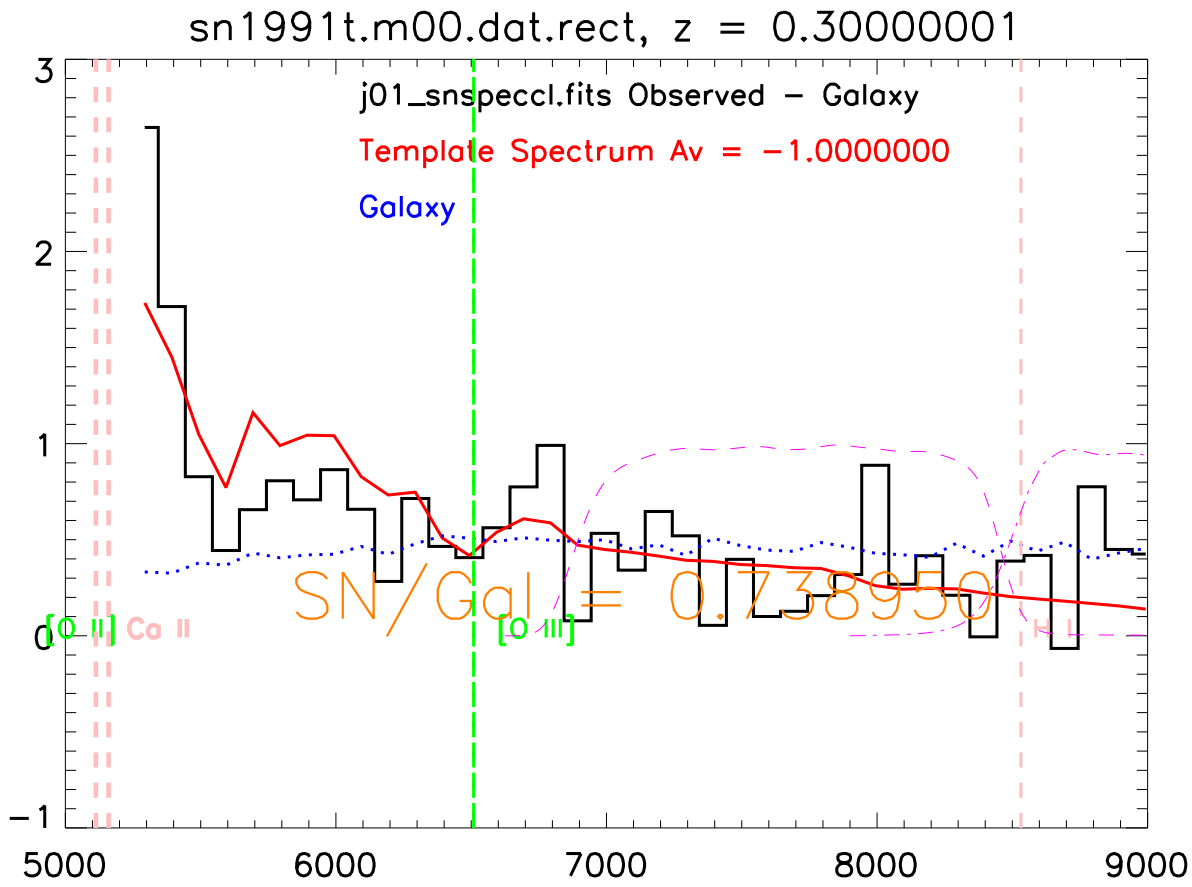

sn1999ee.m01.dat.rect, z = 0.54000002
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.818798
[O II]
Ca II
[O III]
Mg II, I
3
2
1
0
5000
6000
7000
8000
9000


sn1999ee.m06.dat.rect, z = 0.95999998
j01_snspeccl.fits Observed – Galaxy
Template Spectrum Av = 1.0000000
Galaxy
SN/Gal = 0.2836567
Mg II, I
[O II]
Ca II
3
2
1
0
−1
5000
6000
7000
8000
9000

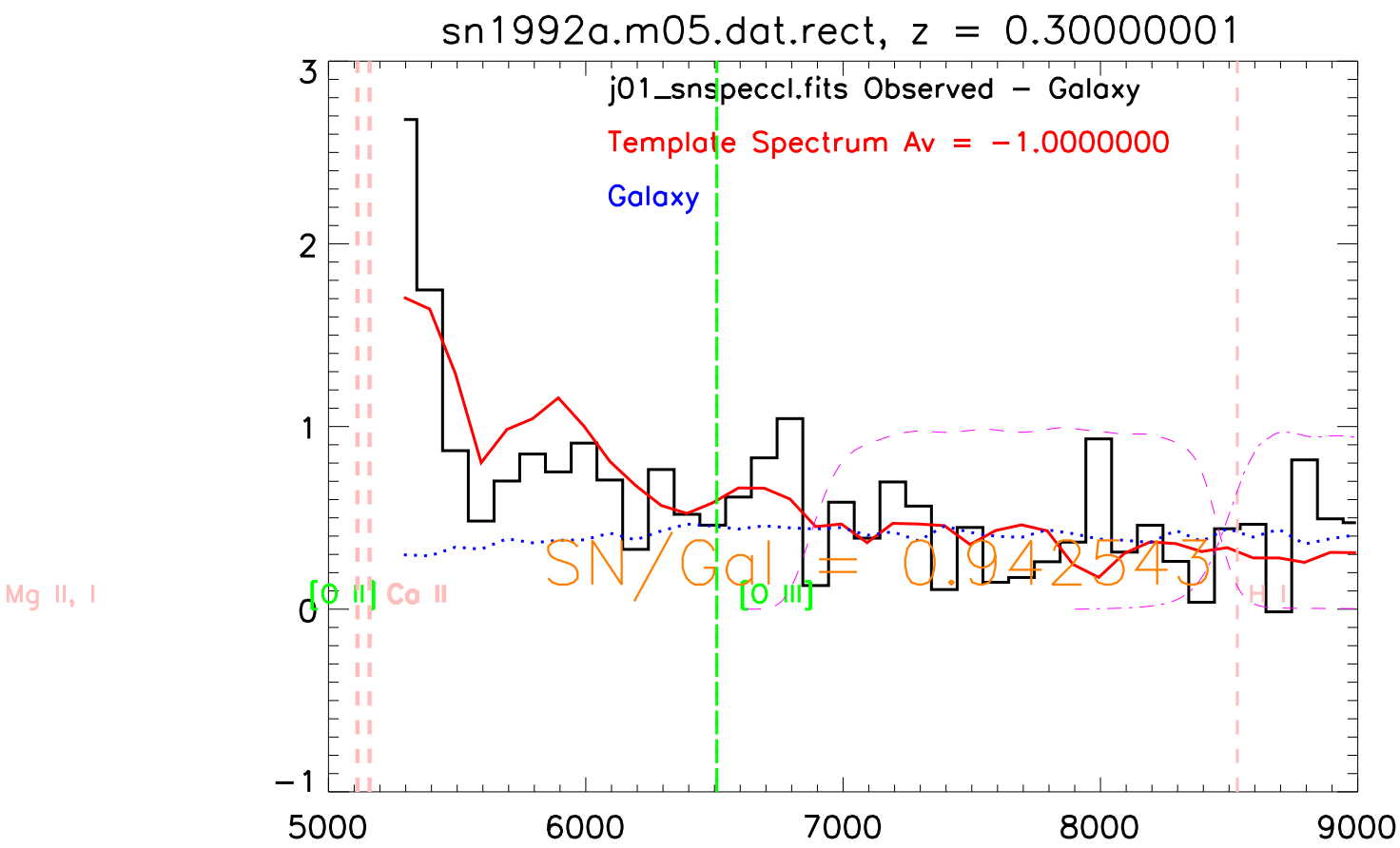

sn1990n.m14.dat.rect, z = 0.30000001
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.5154539
[O II]
Ca II
[O III]
3
2
1
0
−1
5000
6000
7000
8000
9000

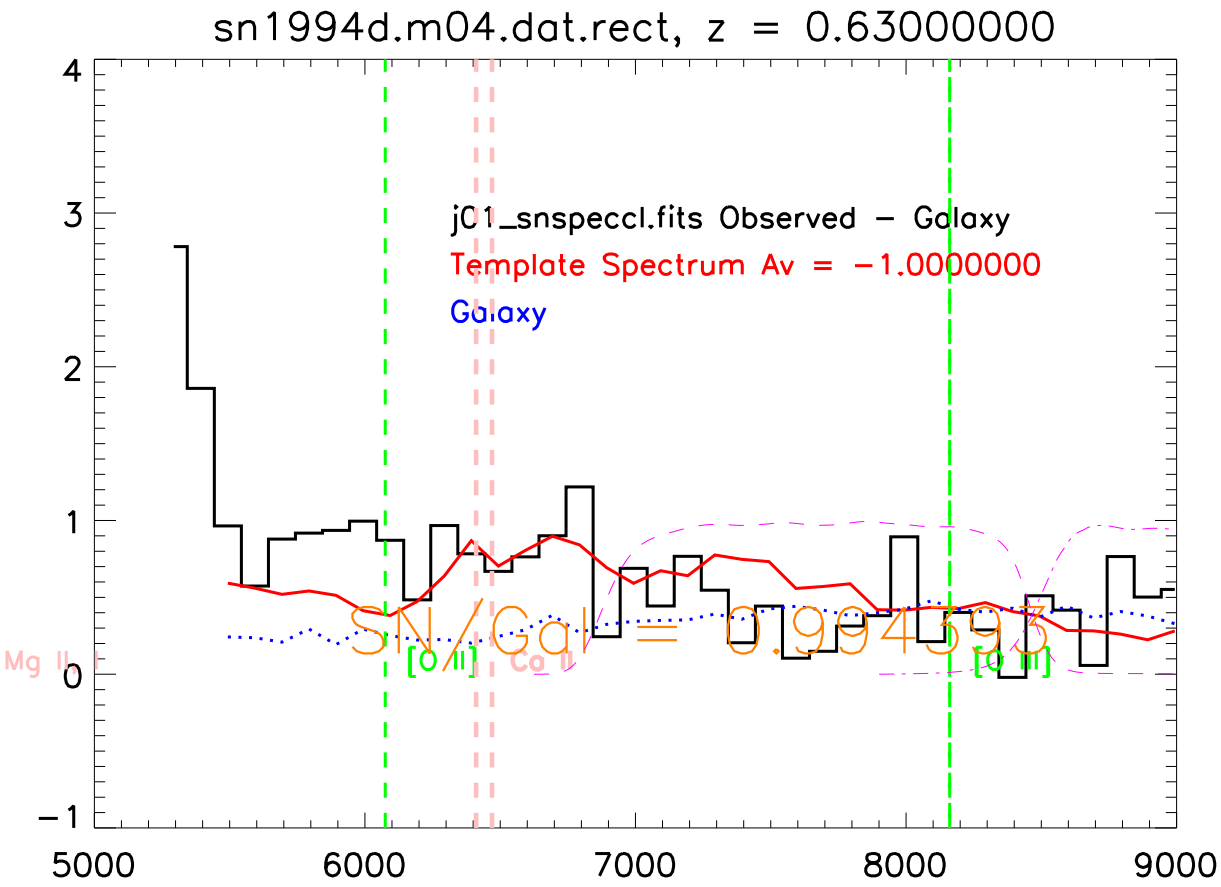
Mg II, I

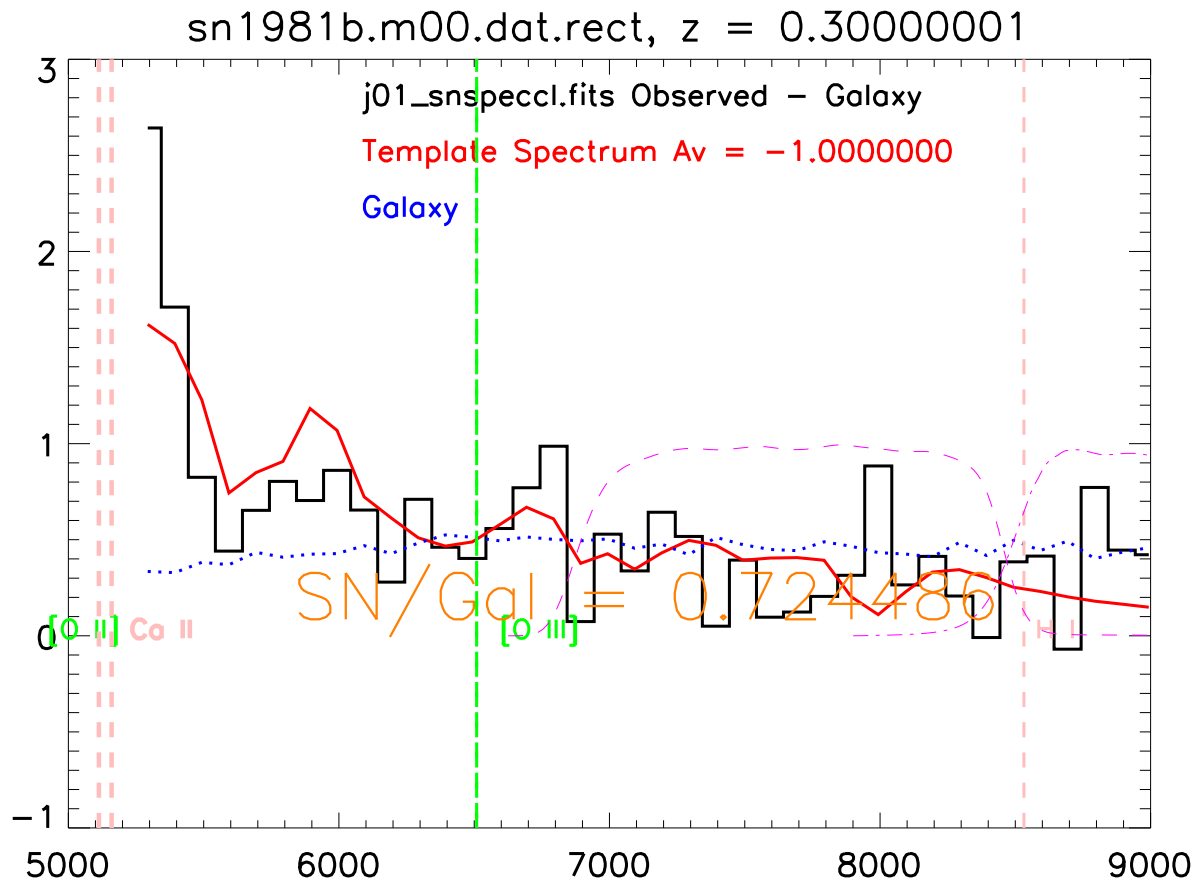

sn1989b.m05.dat.rect, z = 0.30000001
j01_snspeccl.fits Observed – Galaxy
Template Spectrum Av = –1.0000000
Galaxy
SN/Gal= 1.413383
[O II]
Ca II
[O III]
H I
Mg II, I
0
1
2
3
4
5000
6000
7000
8000
9000


sn1991t.m00.dat.rect, z = 0.30000001
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.7738950
[O II]
Ca II
[O III]
3
2
1
0
−1
5000
6000
7000
8000
9000

Mg II, I


sn1992a.m05.dat.rect, z = 0.30000001
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.942545
Mg II, I
[O II]
Ca II
[O III]
H I
3
2
1
0
−1
5000
6000
7000
8000
9000


sn1994d.m04.dat.rect, z = 0.63000000
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.99945935
[O II]
Ca II
[O III]
Mg II
4
3
2
1
0
−1
5000
6000
7000
8000
9000


sn1981b.m00.dat.rect, z = 0.30000001
j01_snspeccl.fits Observed − Galaxy
Template Spectrum Av = −1.0000000
Galaxy
SN/Gal = 0.724486
[O II]
Ca II
[O III]
H L
3
2
1
0
−1
5000
6000
7000
8000
9000

Mg II, I