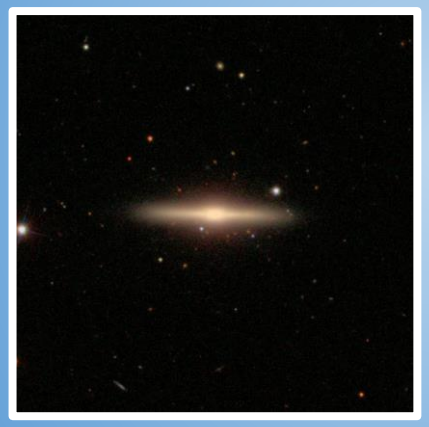
Early-Type Galaxy Stellar Populations in the Near Infrared

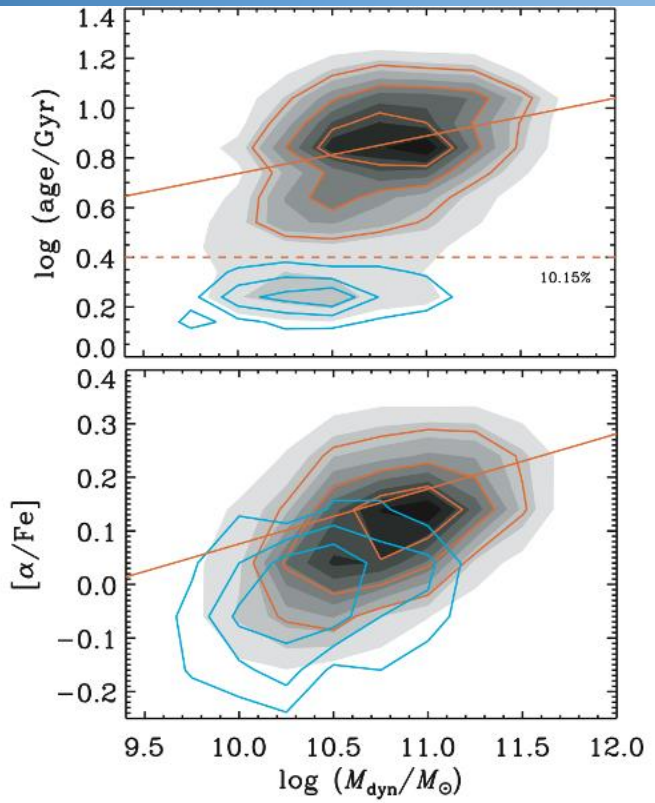


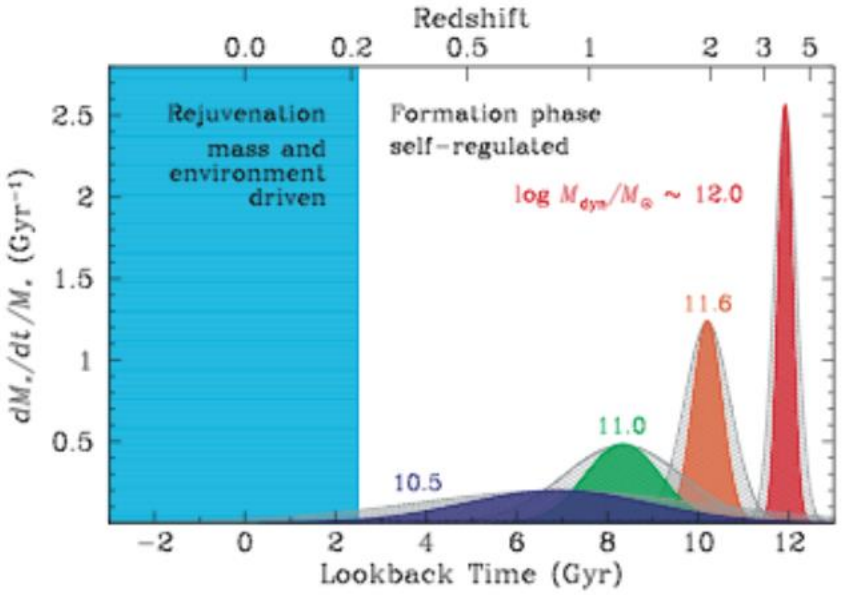
Christina Baldwin

Macquarie University

MACQUARIE University
SYDNEY·AUSTRALIA

The SSP Picture



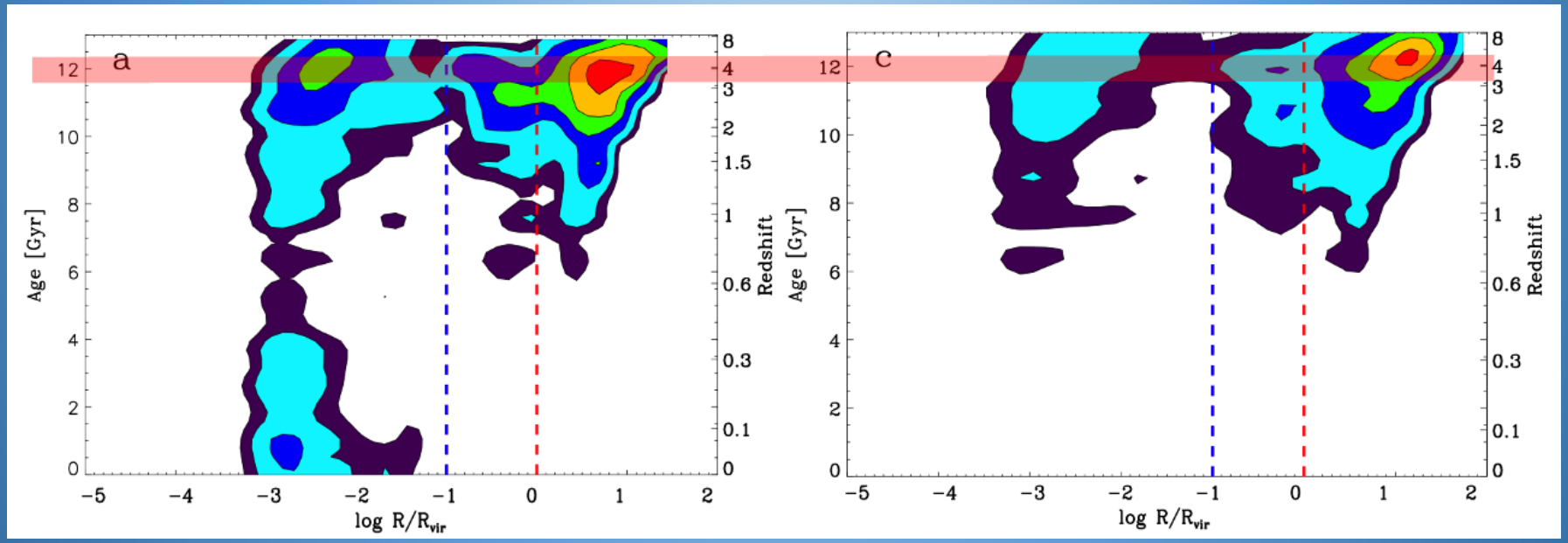


Thomas et al 2005, 2010

Simulations

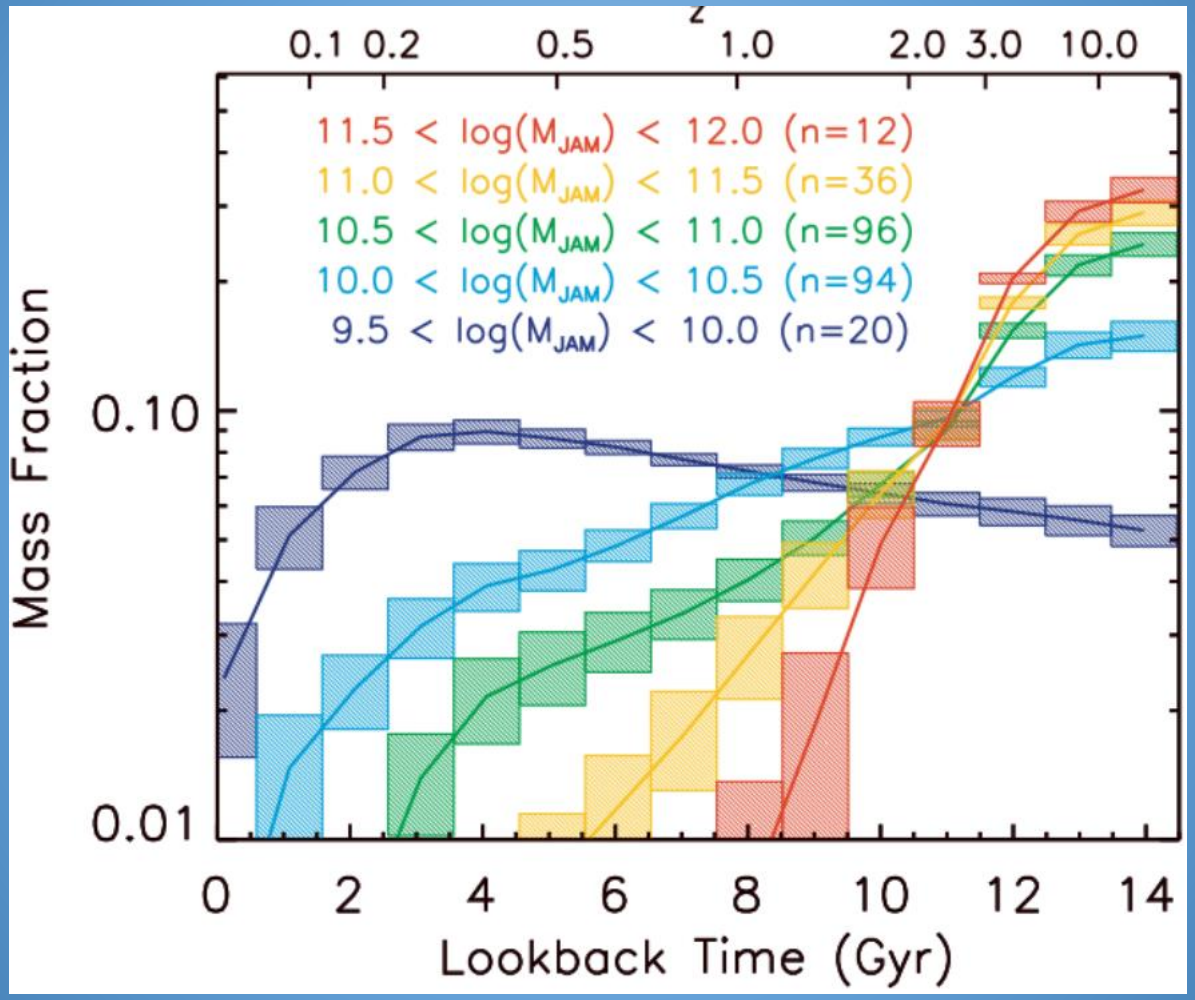
Low mass

High mass



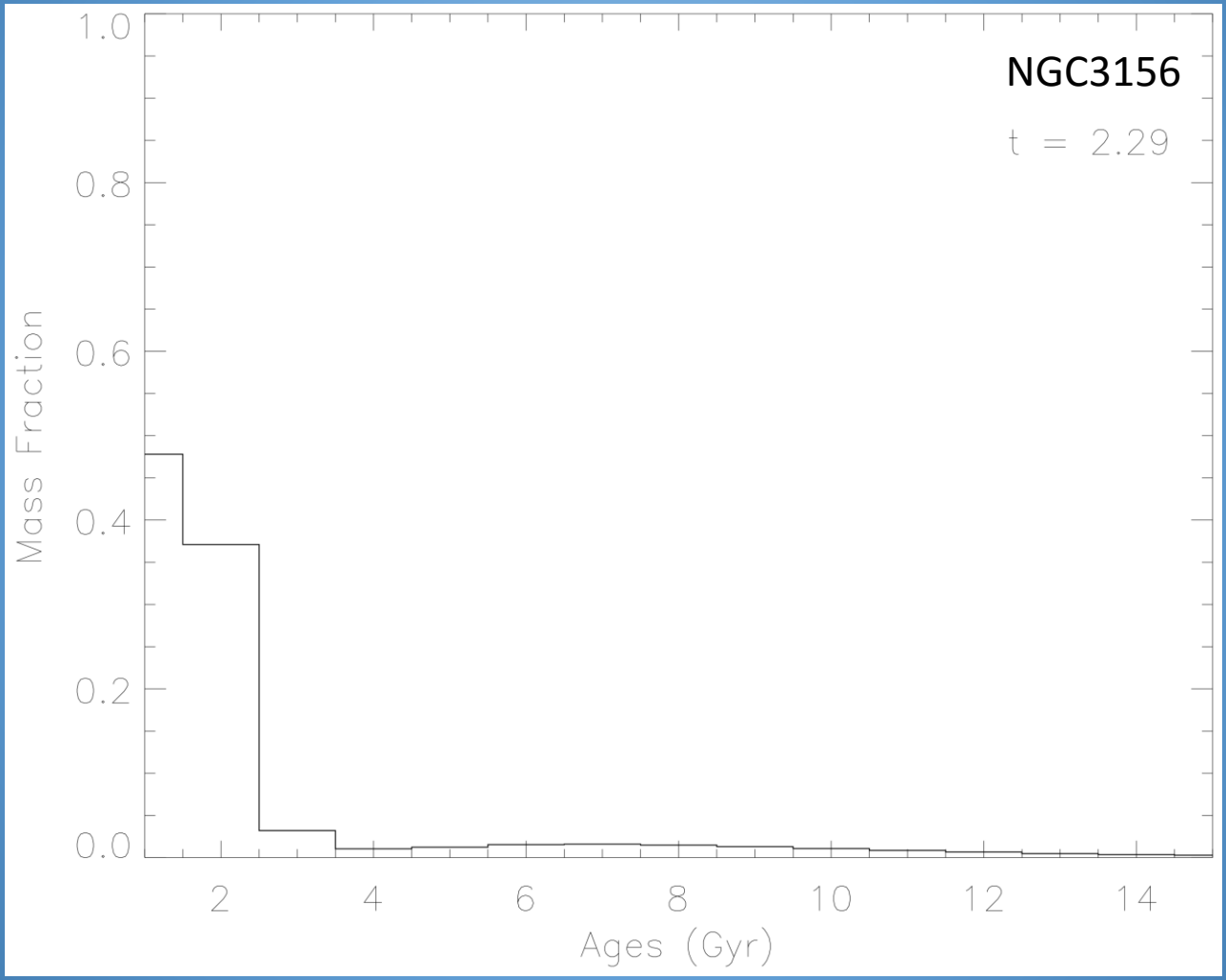
Oser+10

Star Formation Histories

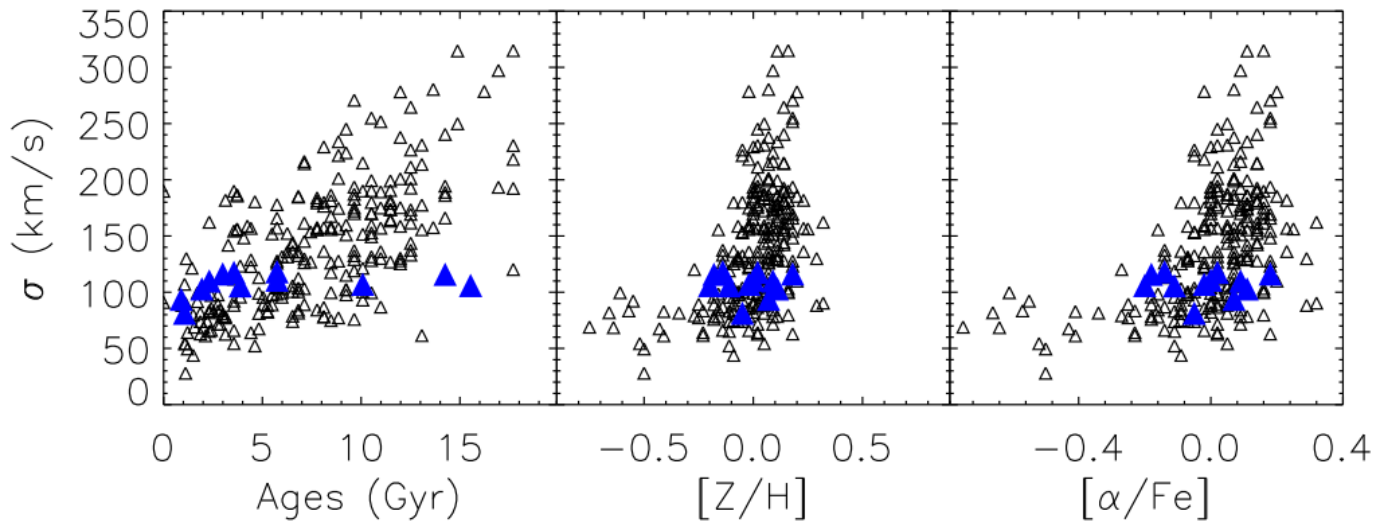


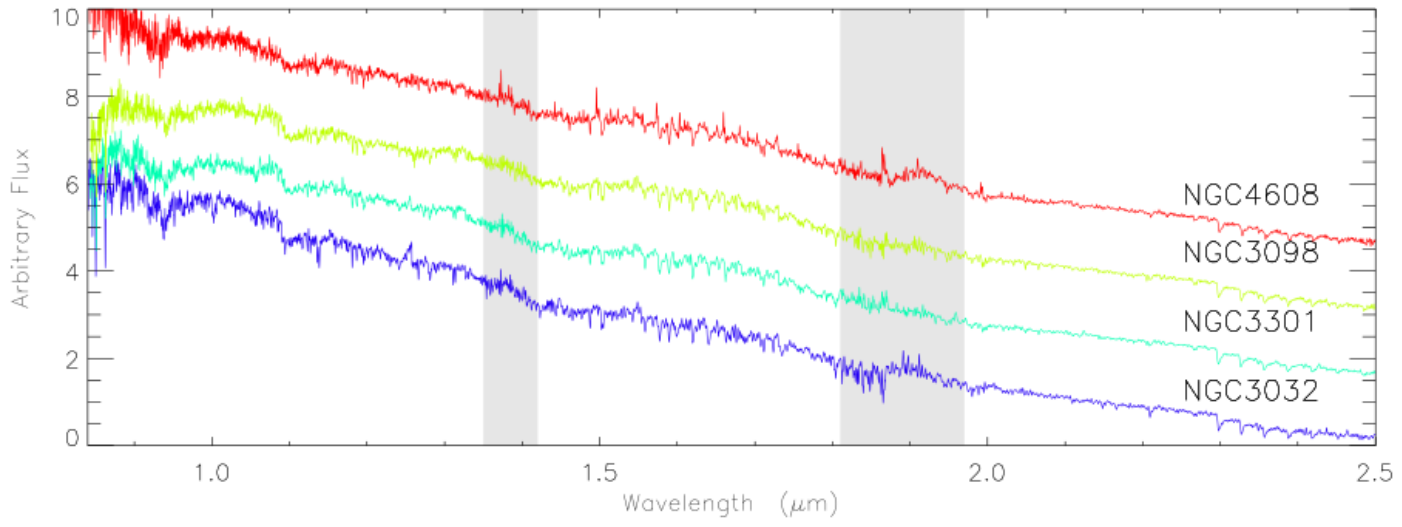
McDermid+15

Star Formation Histories

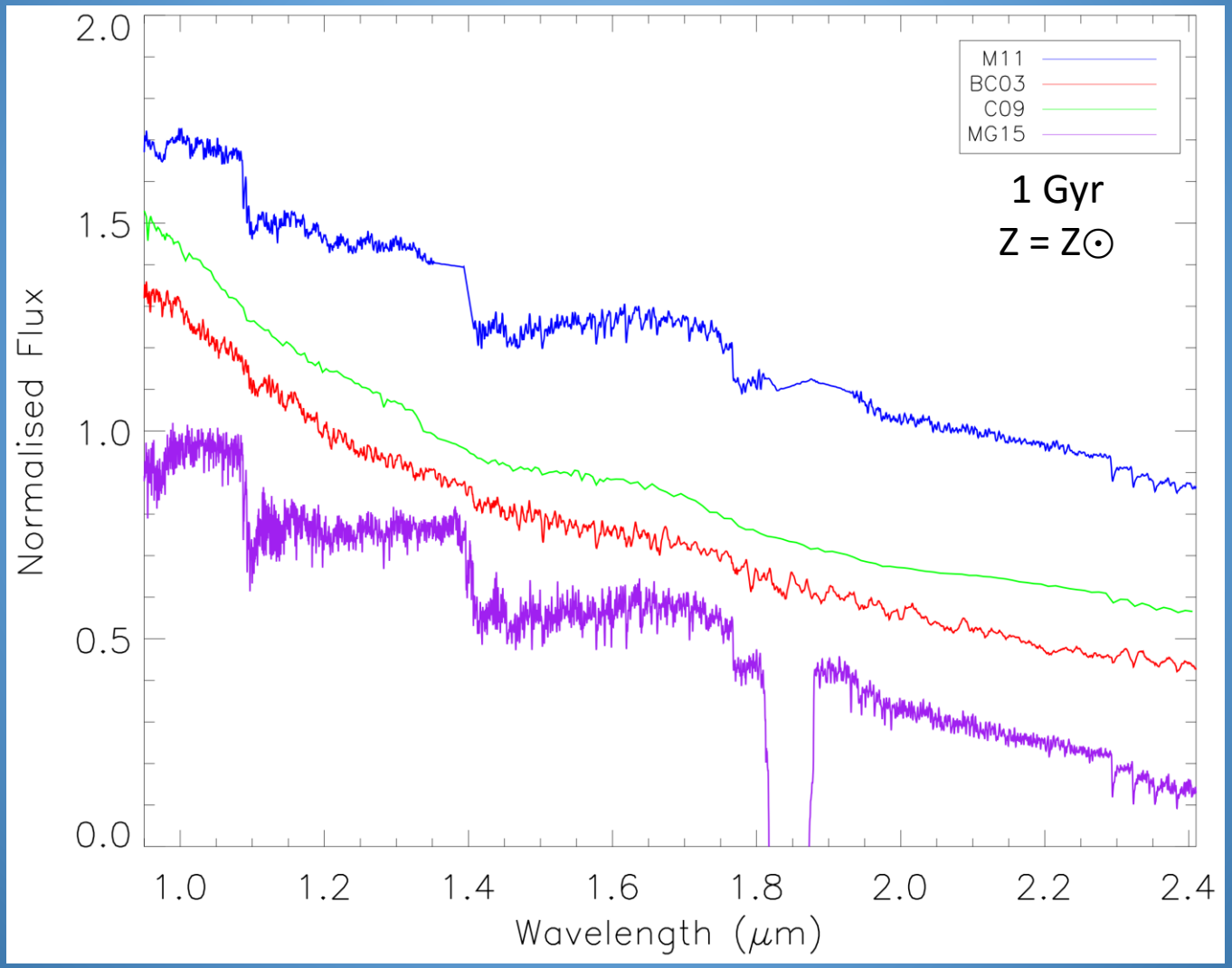


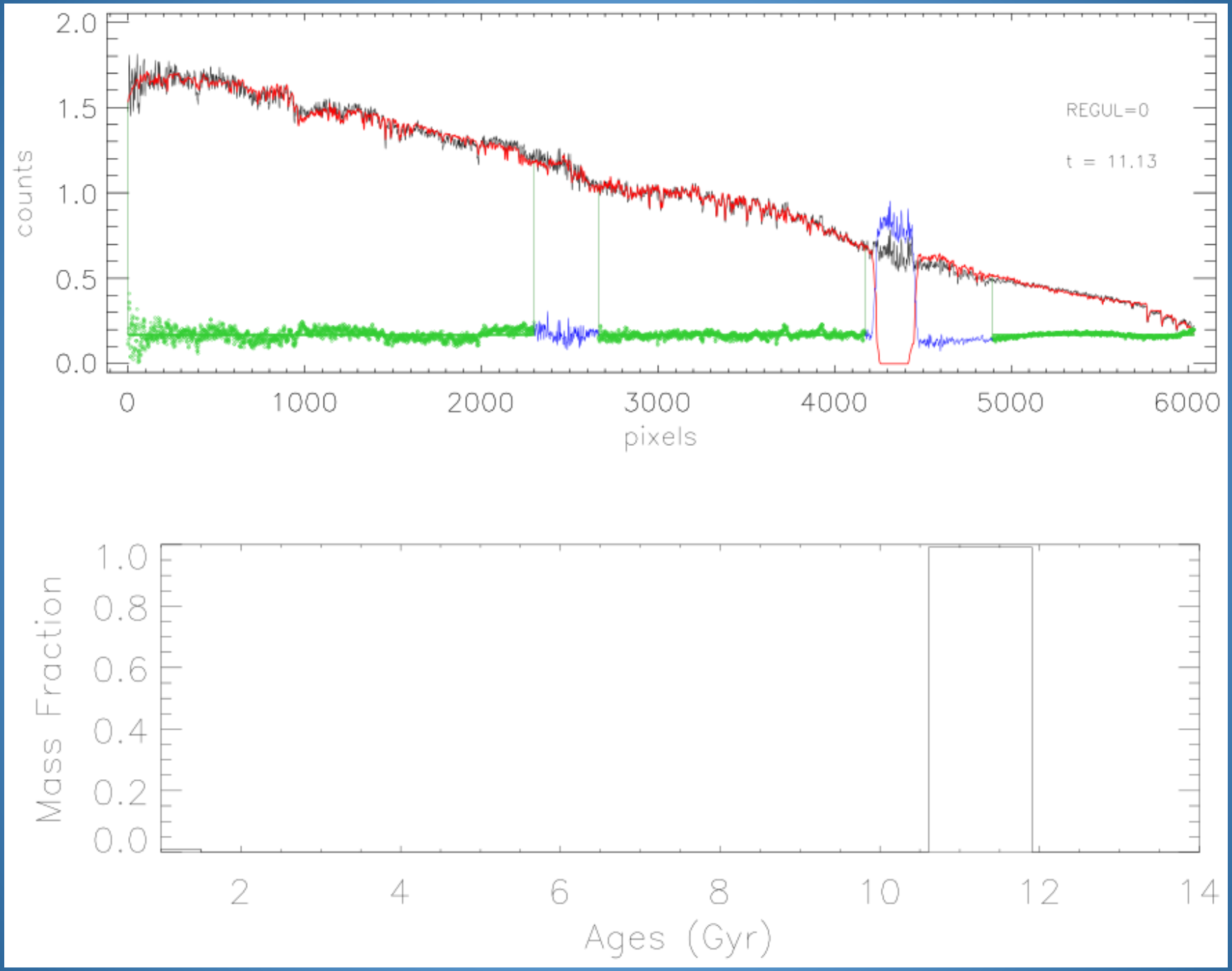
Sample & Data

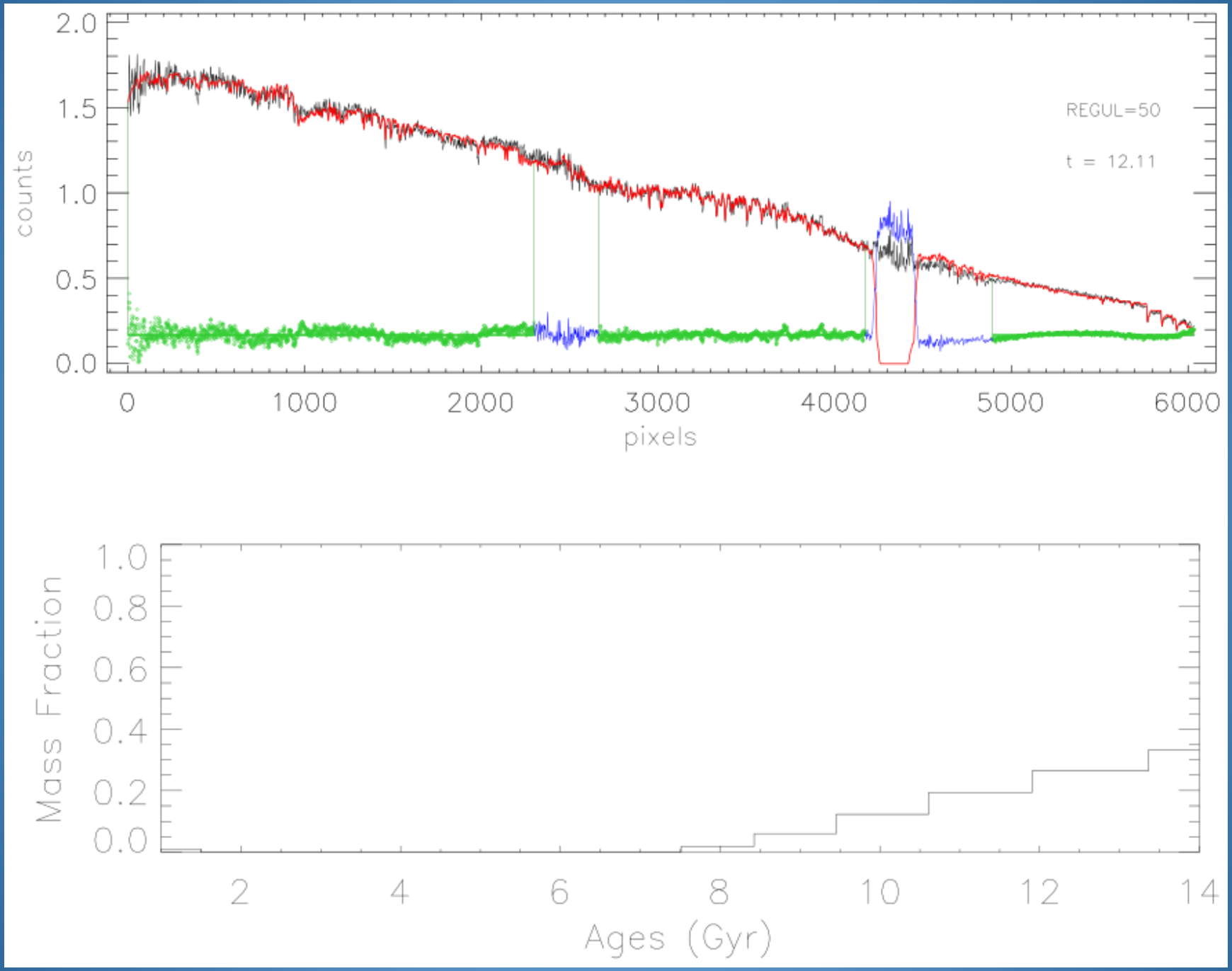

σ (km/s)
350
300
250
200
150
100
50
0
0
5
10
15
Ages (Gyr)
−0.5
0.0
0.5
[Z/H]
−0.4
0.0
0.4
[α/Fe]

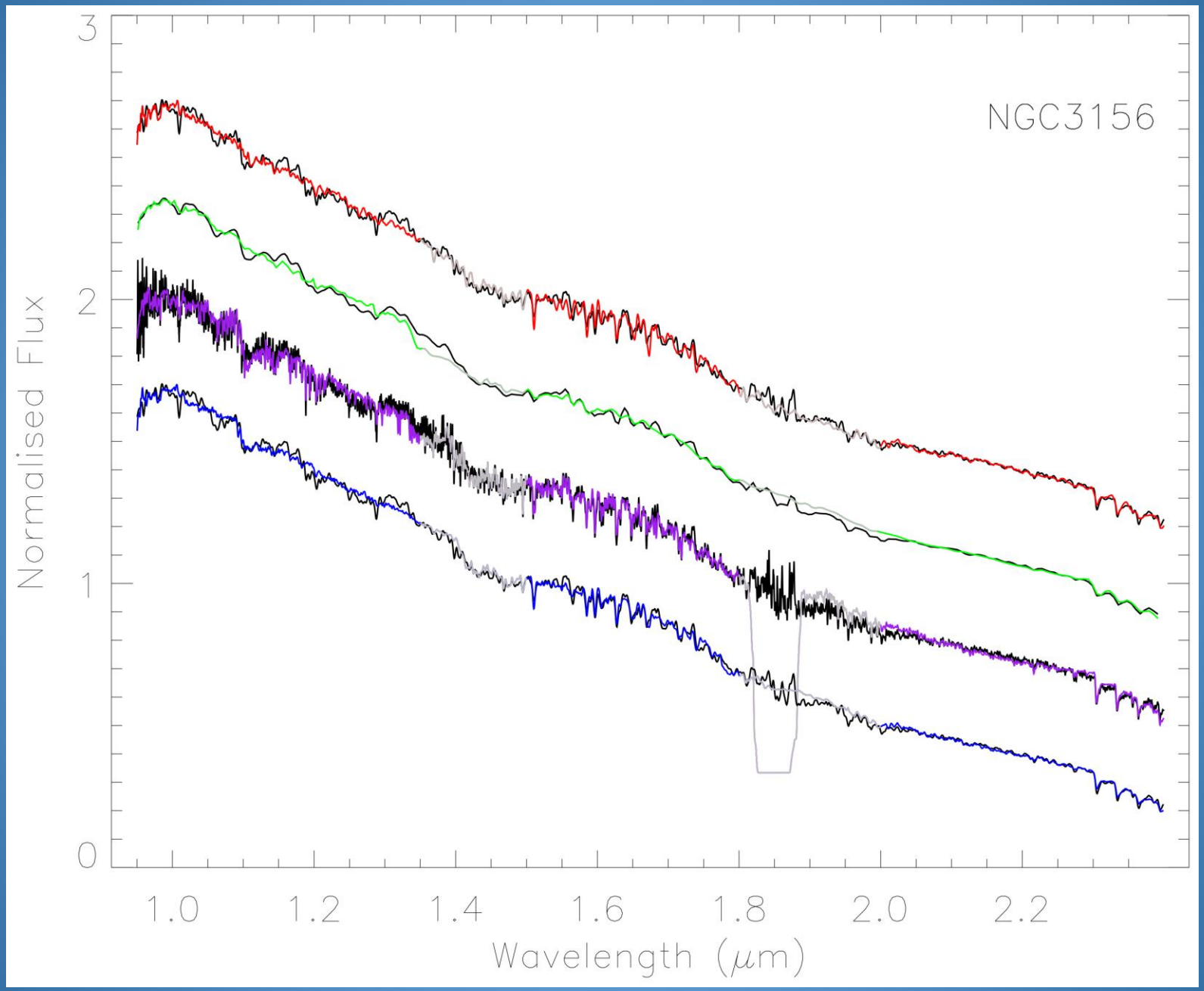

Arbitrary Flux
10
8
6
4
2
0
1.0
1.5
2.0
2.5
Wavelength (μm)
NGC4608
NGC3098
NGC3301
NGC3032

Problem: NIR Models Inconsistent

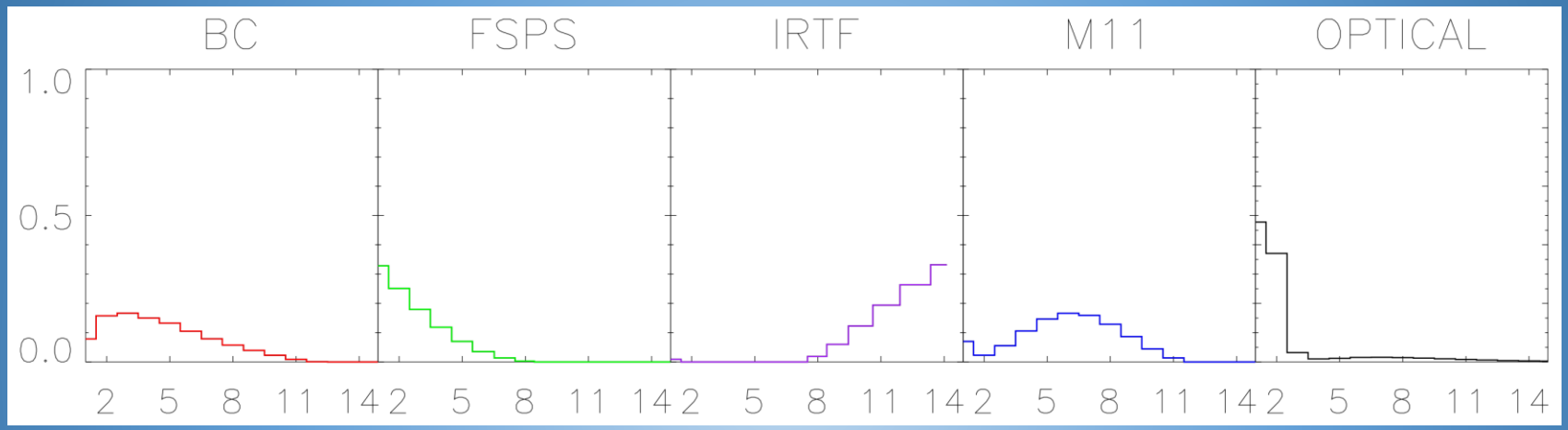



2.0
1.5
1.0
0.5
0.0
counts
REGUL=0
t = 11.13
0
1000
2000
3000
4000
5000
6000
pixels
1.0
0.8
0.6
0.4
0.2
0.0
Mass Fraction
2
4
6
8
10
12
14
Ages (Gyr)


2.0
1.5
1.0
0.5
0.0
counts
REGUL=50
t = 12.11
0
1000
2000
3000
4000
5000
6000
pixels
1.0
0.8
0.6
0.4
0.2
0.0
Mass Fraction
2
4
6
8
10
12
14
Ages (Gyr)


NGC3156
Normalised Flux
0
1
2
3
1.0
1.2
1.4
1.6
1.8
2.0
2.2
Wavelength (μm)

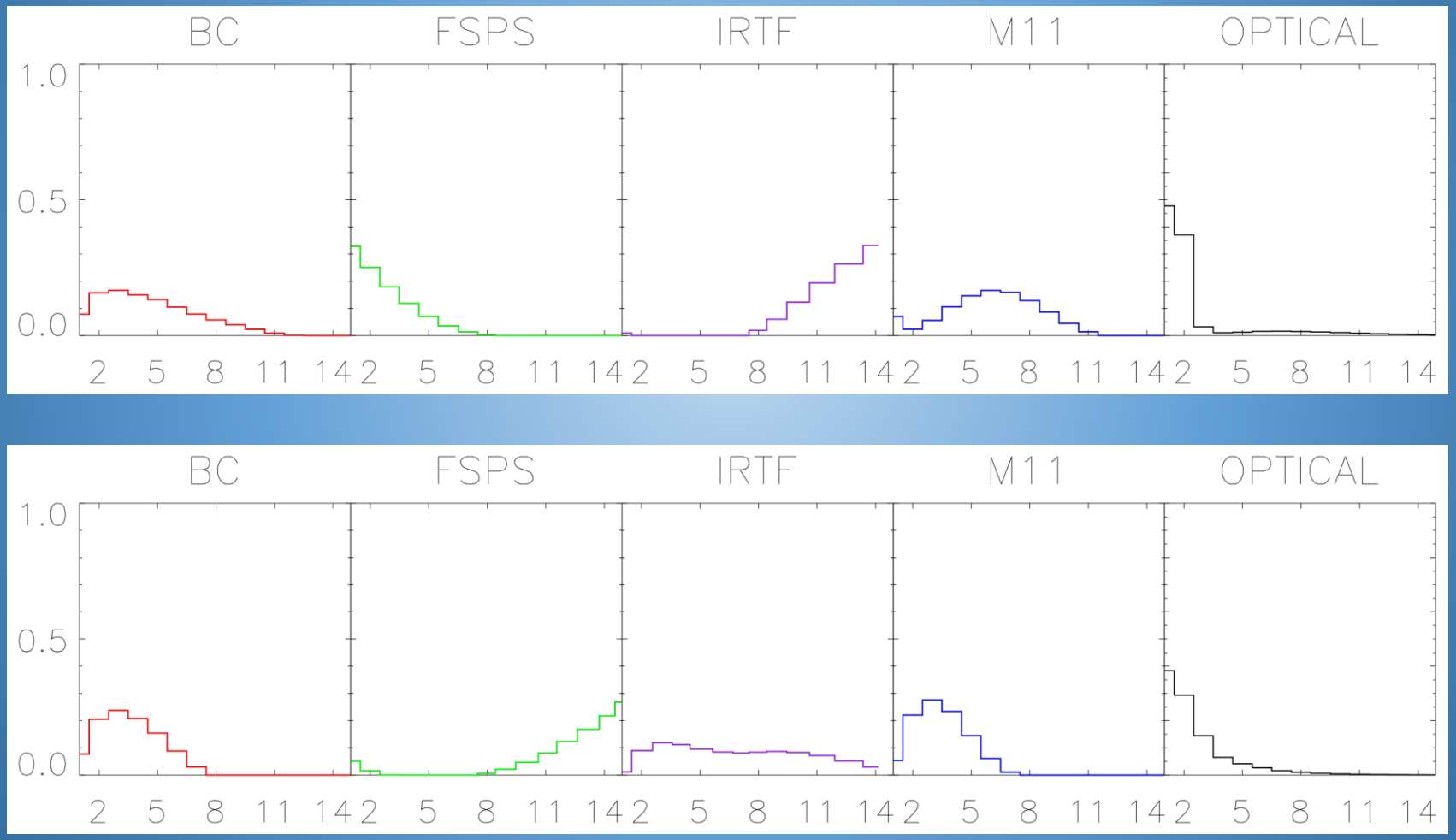
Star Formation Histories

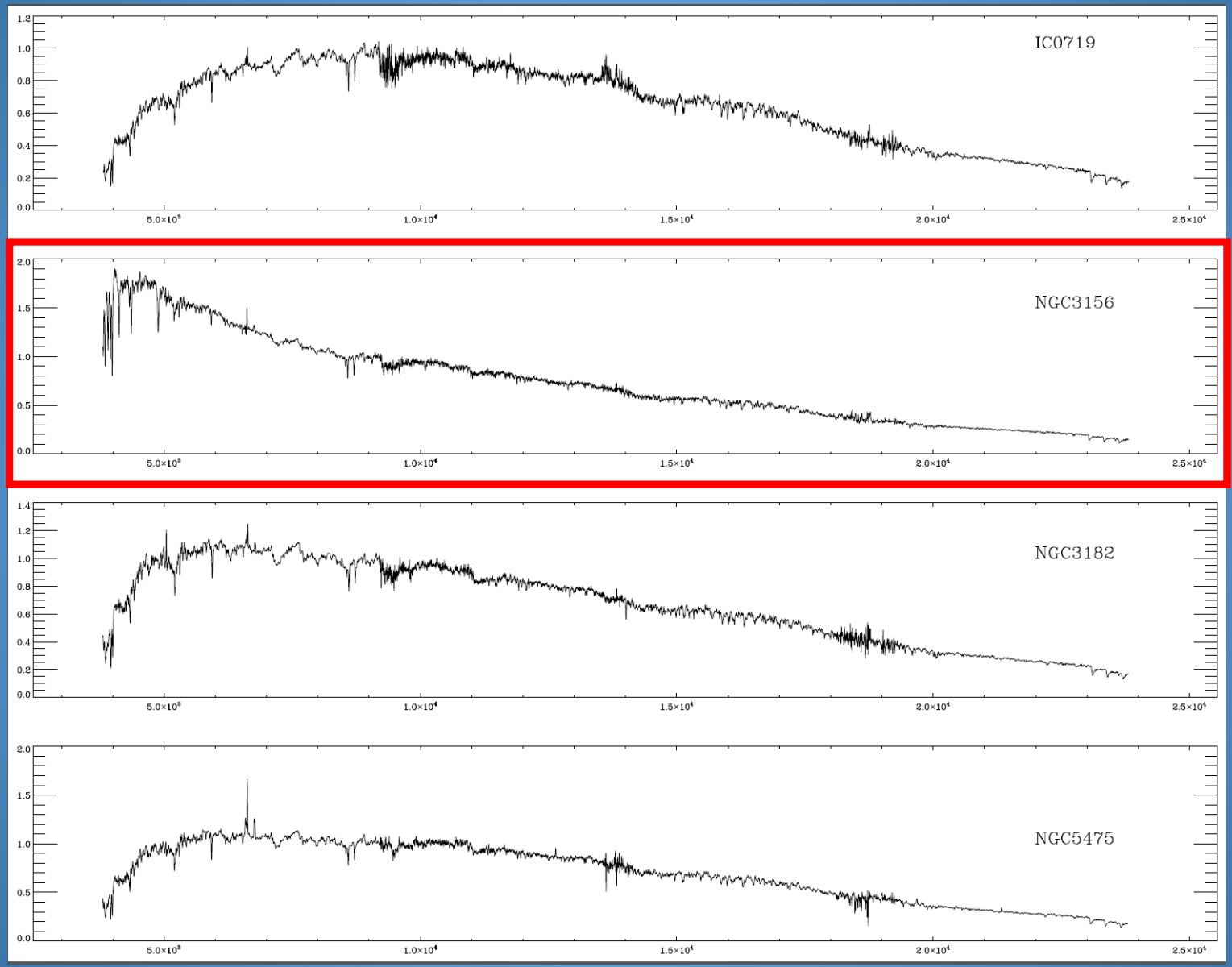


Mass Fraction

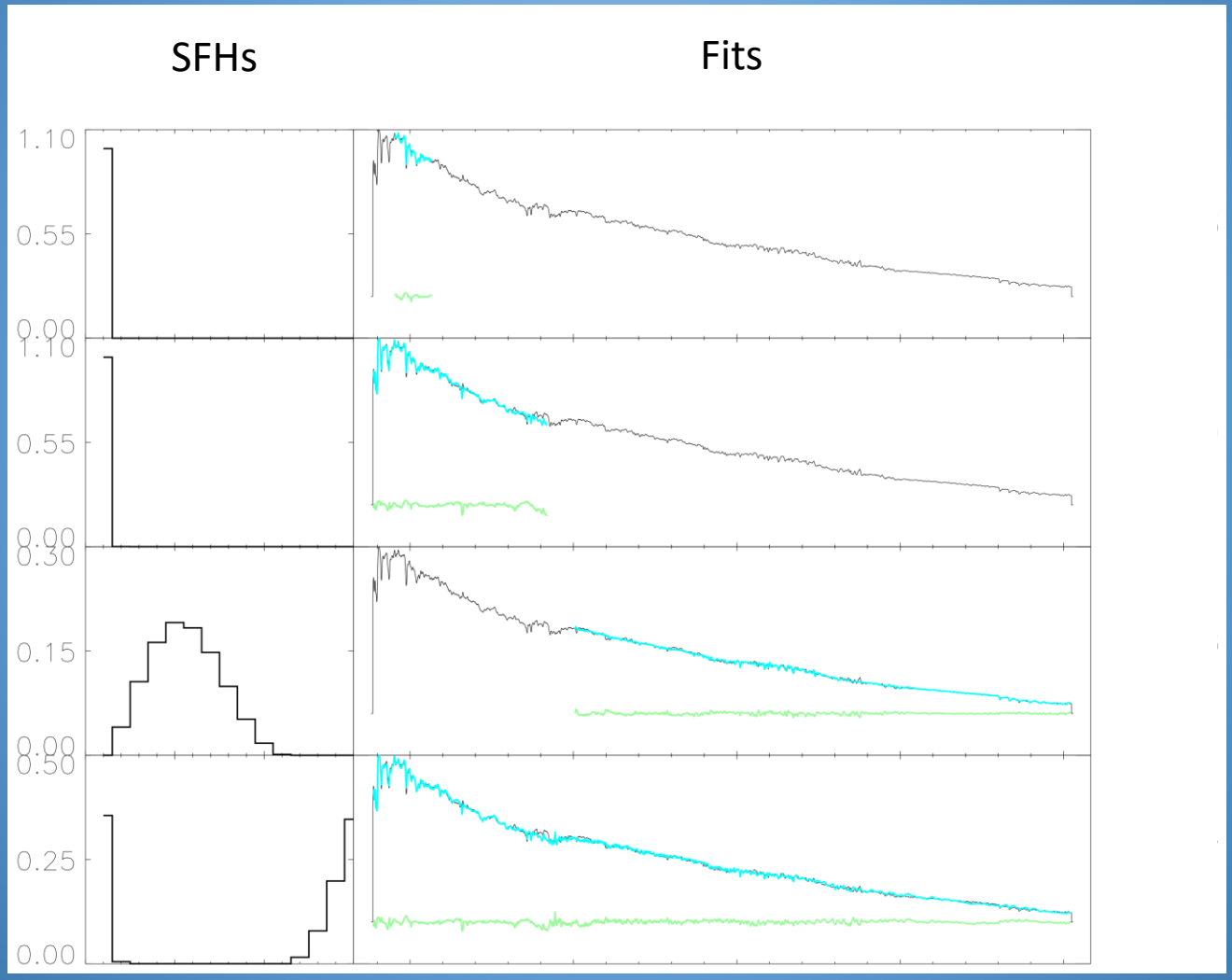
Age

Star Formation Histories

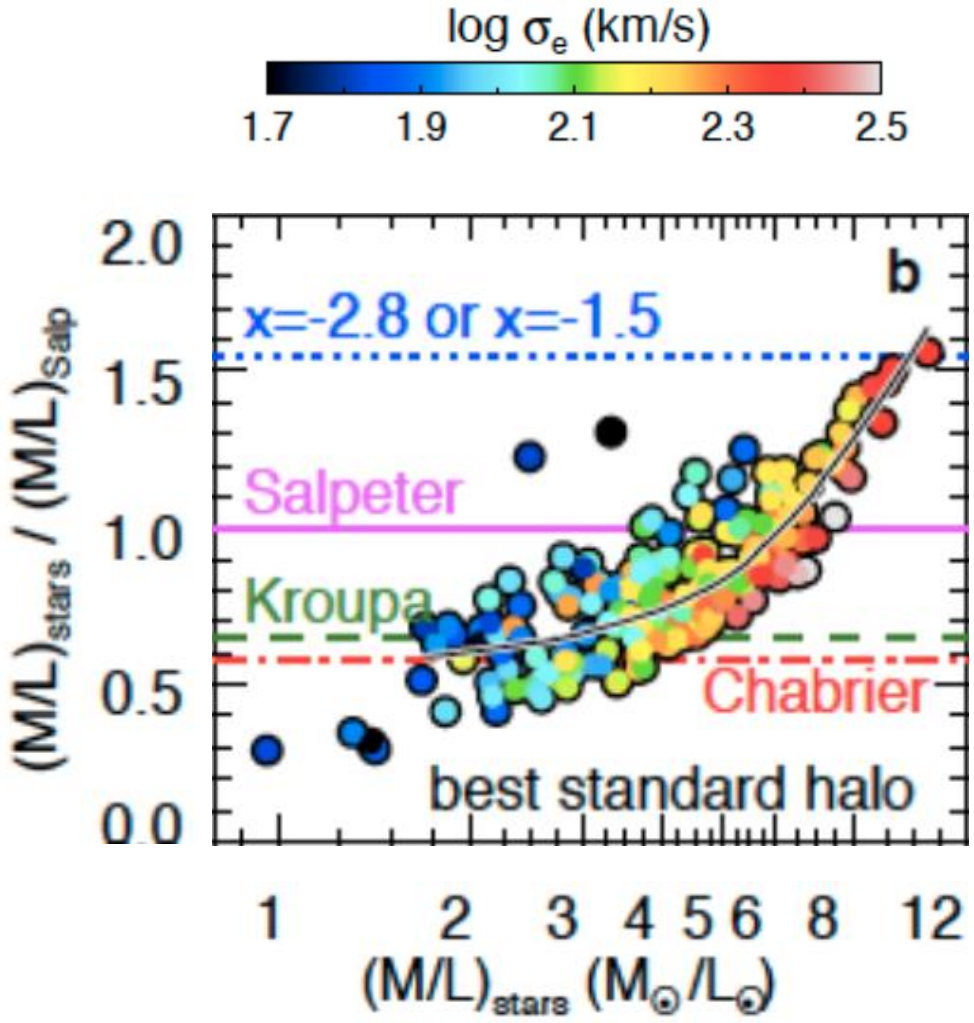


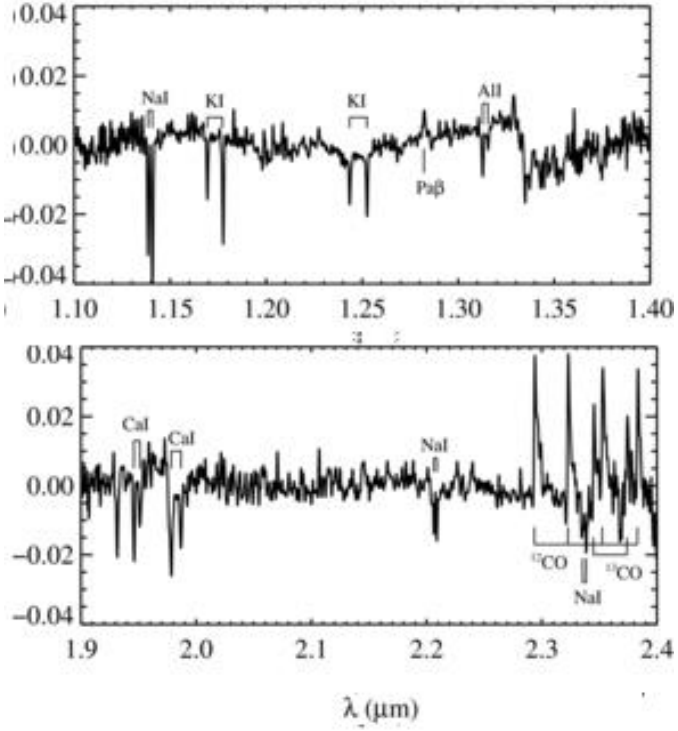

IC0719
NGC3156
NGC3182
NGC5475
5.0×10³
1.0×10⁴
1.5×10⁴
2.0×10⁴
2.5×10⁴

Full Spectrum



Future Work


log σe (km/s)
1.7
1.9
2.1
2.3
2.5
b
x=-2.8 or x=-1.5
Salpeter
Kroupa
Chabrier
best standard halo
(M/L)stars / (M/L)Salp
(M/L)stars (M⊙/L⊙)


NaI
KI
KI
AlI
Paβ
CaI
CaI
NaI
NaI
λ (μm)

Conclusions

- Comparable NIR fits give very different SFHs
- NIR SFHs don’t consistently match optical SFHs
- Fitting NIR + optical may give better results than fitting NIR alone
  - need to be cautious of e.g. resolution/error issues when fitting such a long wavelength range