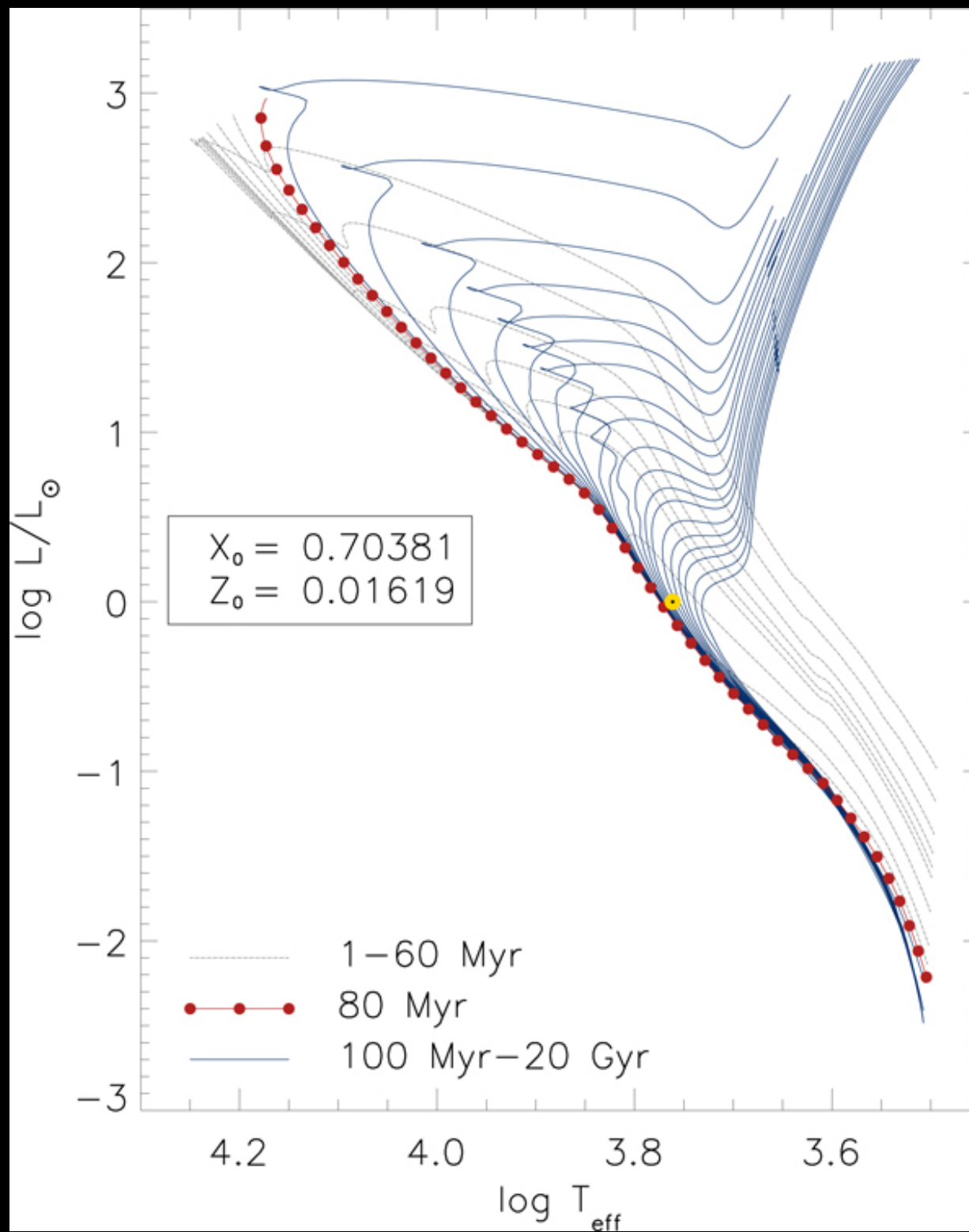


Star clusters and stellar population synthesis

Ay 20, Fall 2019, Lecture 13
Vikram Ravi



**Yale-
Potsdam
stellar
isochrones**



47 Tuc



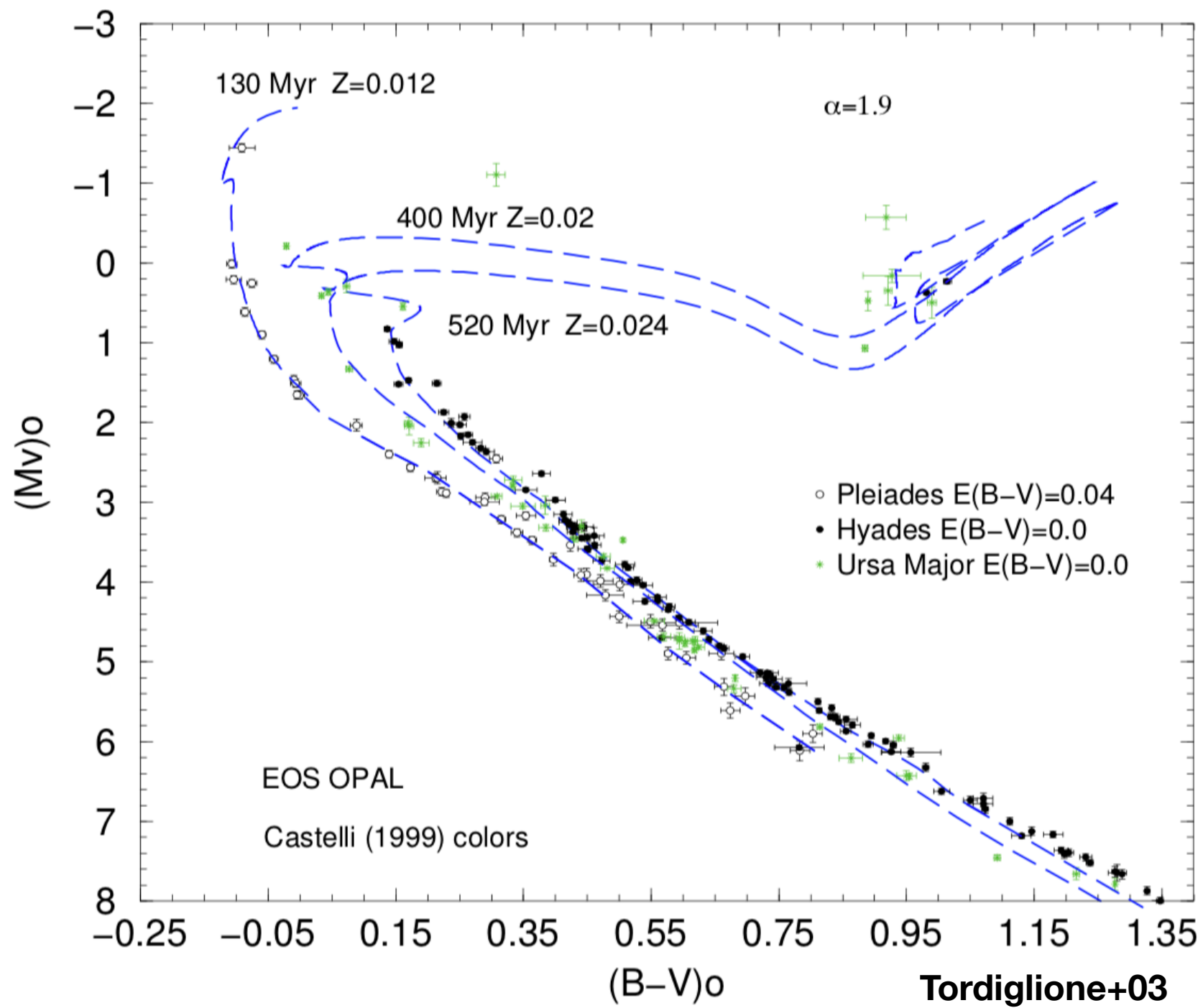
Pleiades

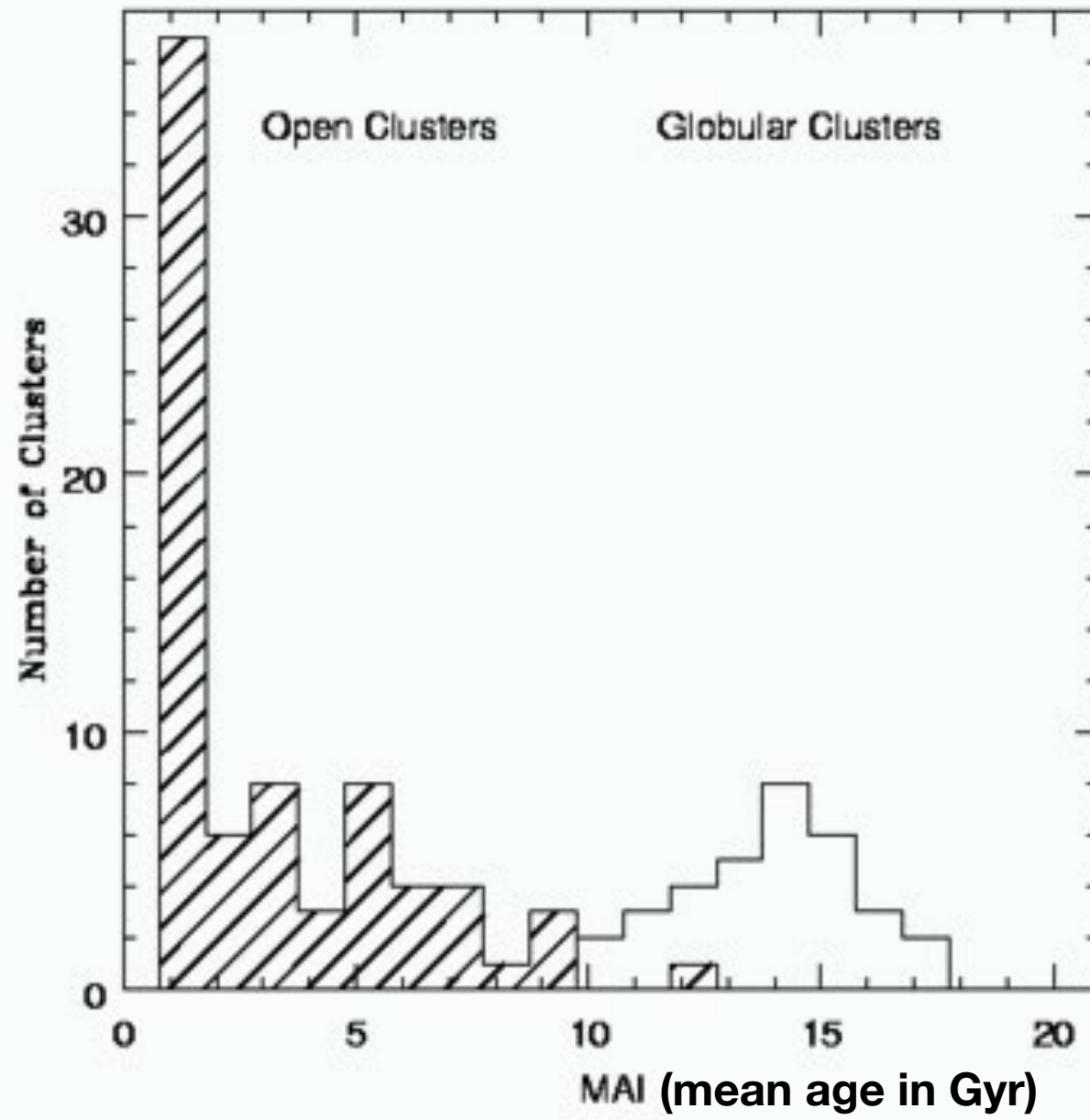
Summary of cluster properties

	Globular Clusters	Open Clusters
central density	circa $10^4 \text{ M}_\odot \text{ pc}^{-3}$	circa $100 \text{ M}_\odot \text{ pc}^{-3}$
core radius	1.5 pc	1 pc
median radius	10 pc	2 pc
tidal radius	50 pc	10 pc
central velocity dispersion	7 km/s	1 km/s
mass-to-light raio	$2 \text{ M}_\odot / \text{L}_\odot$	$1 \text{ M}_\odot / \text{L}_\odot$
typical mass	$5 \times 10^5 \text{ M}_\odot$	250 M_\odot
lifetime	10^{10} years	10^8 years

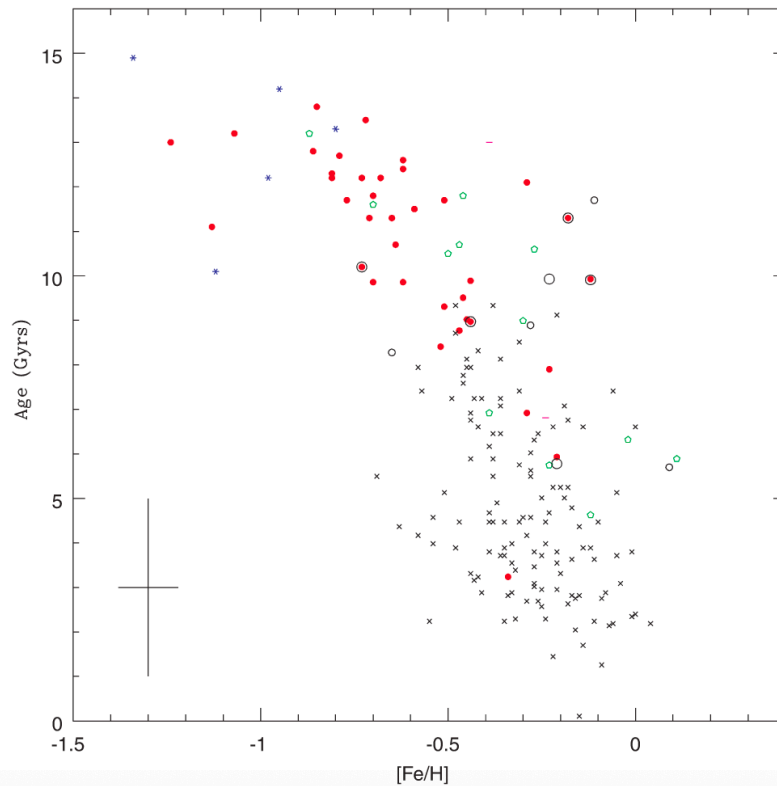
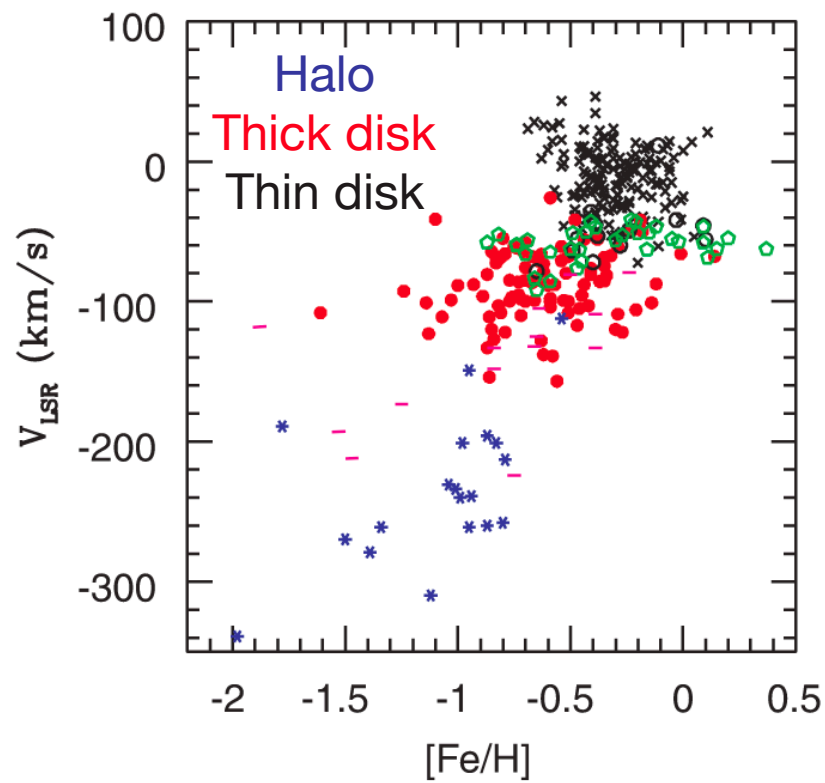
Adapted from Binney and Tremaine, Table 1-3, page 26

C. Flynn



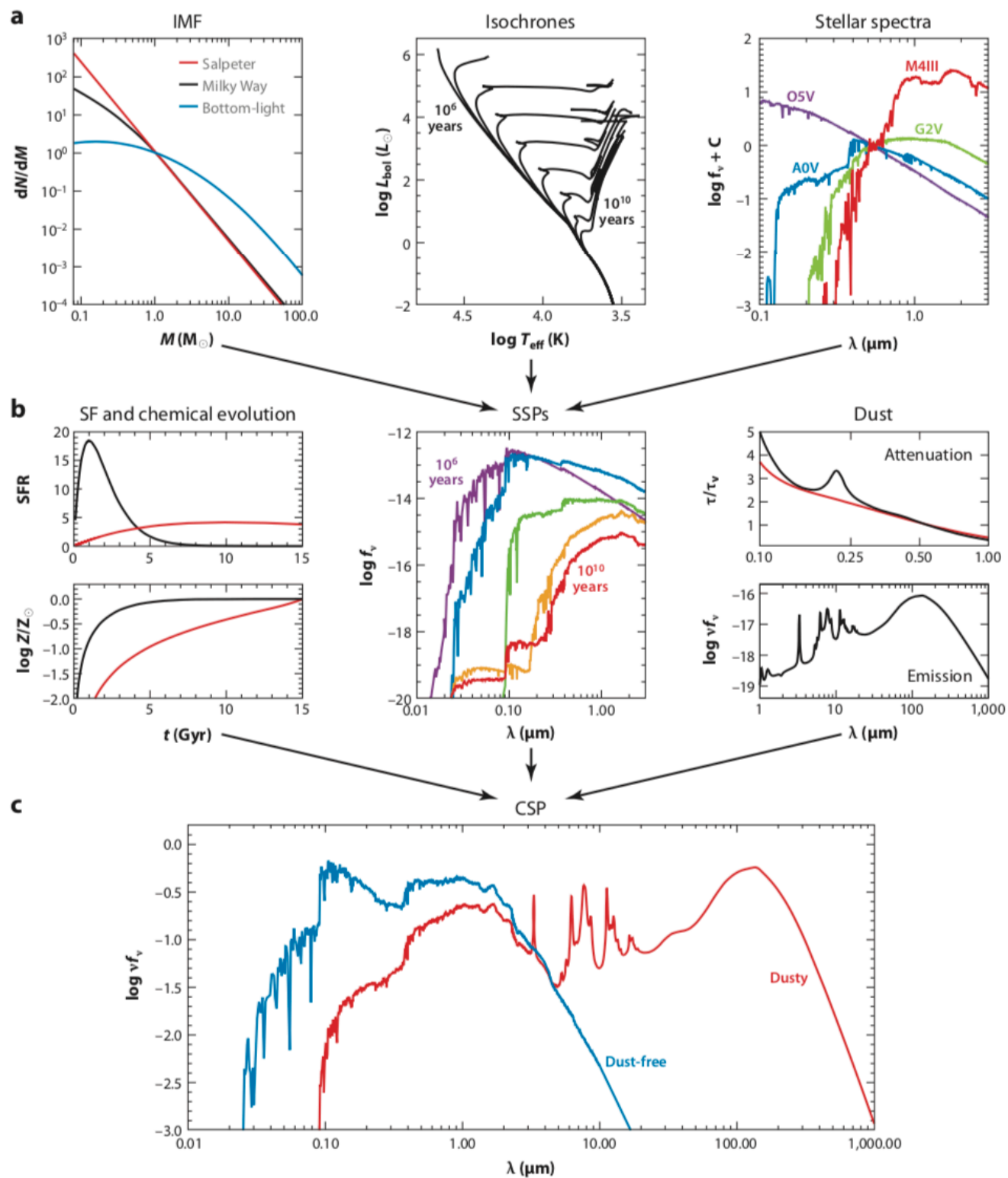


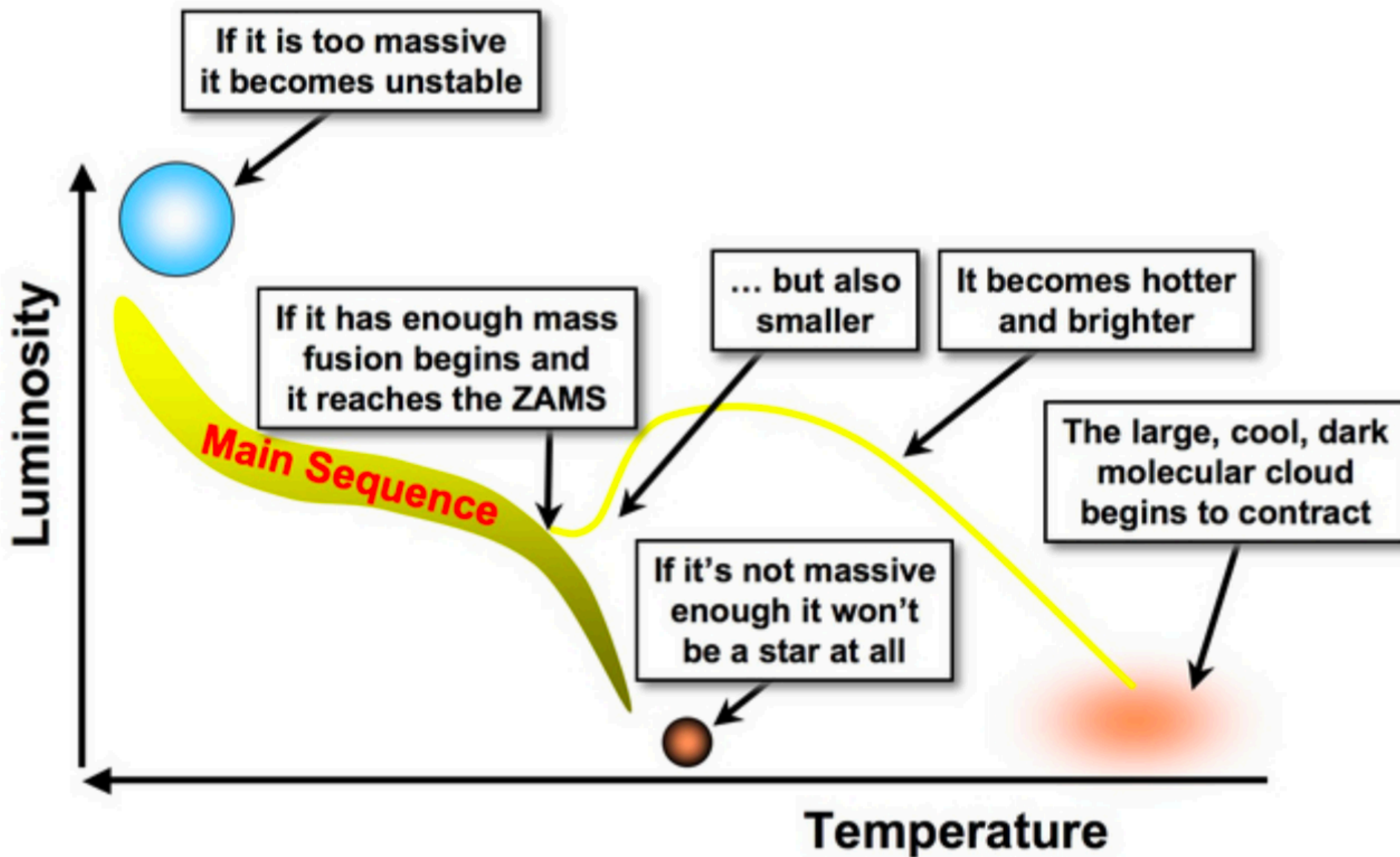
C. Flynn

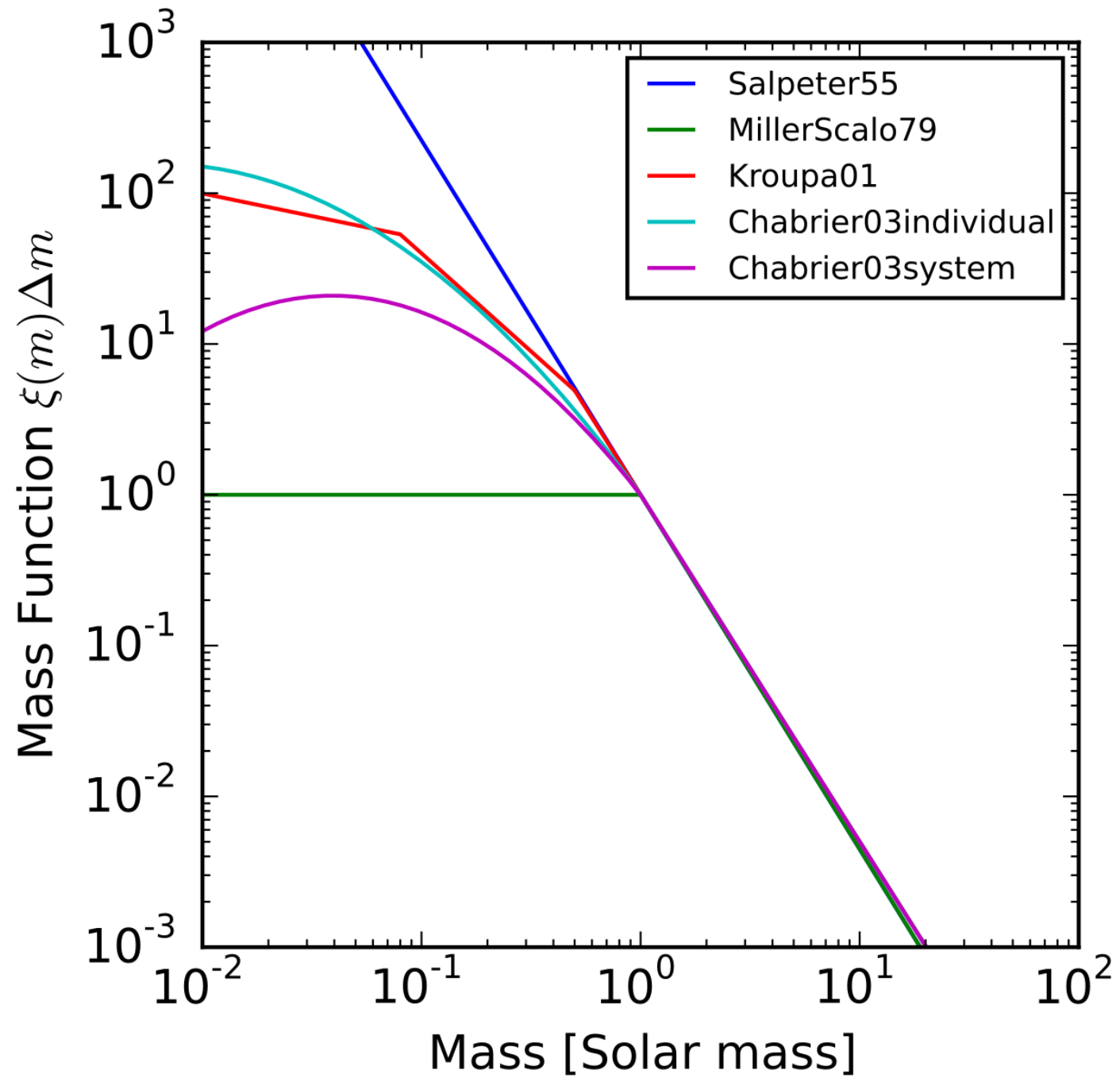


Reddy+06
C. Flynn

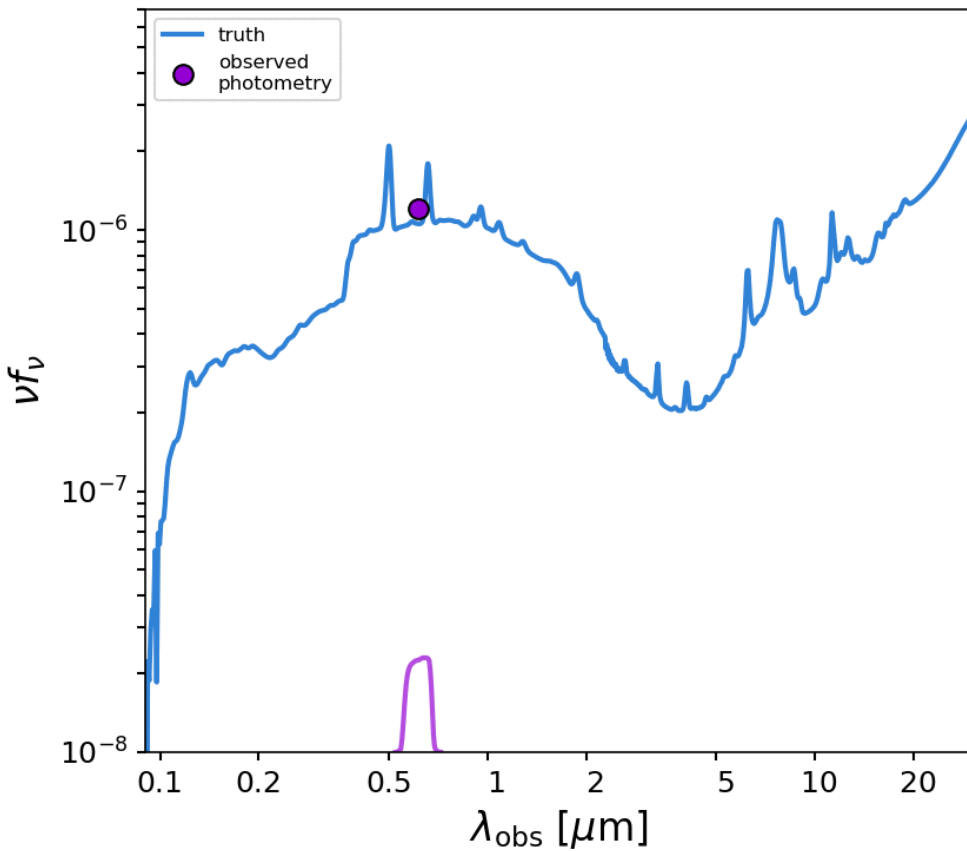
	Population I	Population II
Age	Young disk : $< \sim 1$ Gyr Old disk : $\sim 1 - 10 \times 10^9$ years	$12-15 \times 10^9$ years
Metallicity [Fe/H]	$-0.5 < \sim [\text{Fe}/\text{H}] < \sim 0.3$	Halo : $-3.0 < \sim [\text{Fe}/\text{H}] < \sim -1.0$ Bulge : $-0.5 < \sim [\text{Fe}/\text{H}] < \sim 0.5$
Rotation, km/s	Young disk: 220 Old disk : 180 - 200	Halo : 20 ± 20 Bulge : circa 100
Velocity Dispersion in (U,V,W) km/s	Young disk : (40, 30, 10) Old disk : (80, 60, 20)	Halo : (150, 100, 100) Bulge : ~ 130 km/s



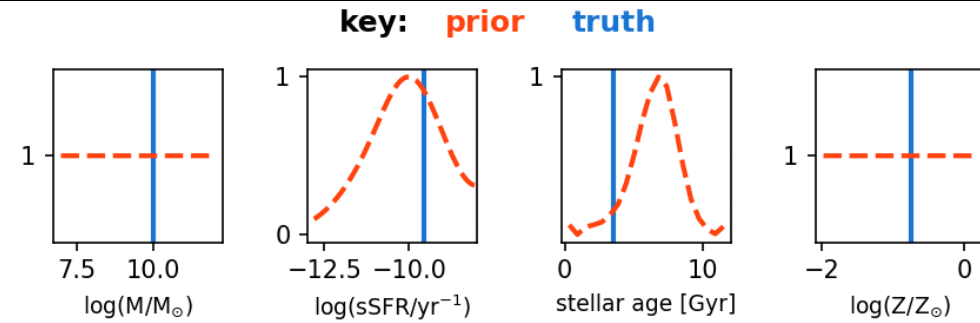




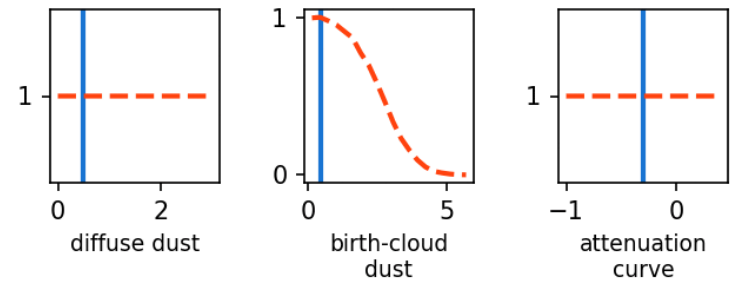
optical: SDSS *r*



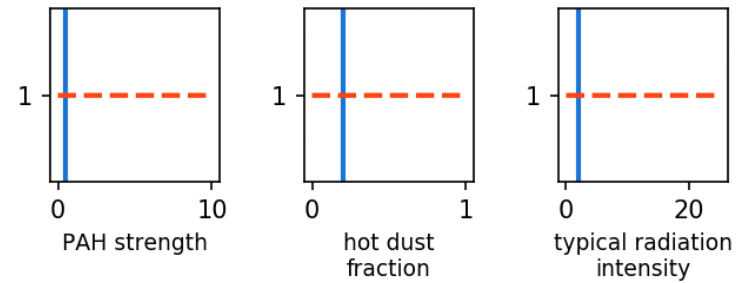
Stellar parameters



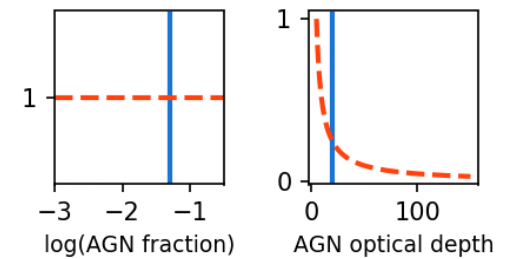
Dust attenuation parameters



Dust emission parameters



AGN parameters



Prospector (Leja, Johnson, Conroy ++)