

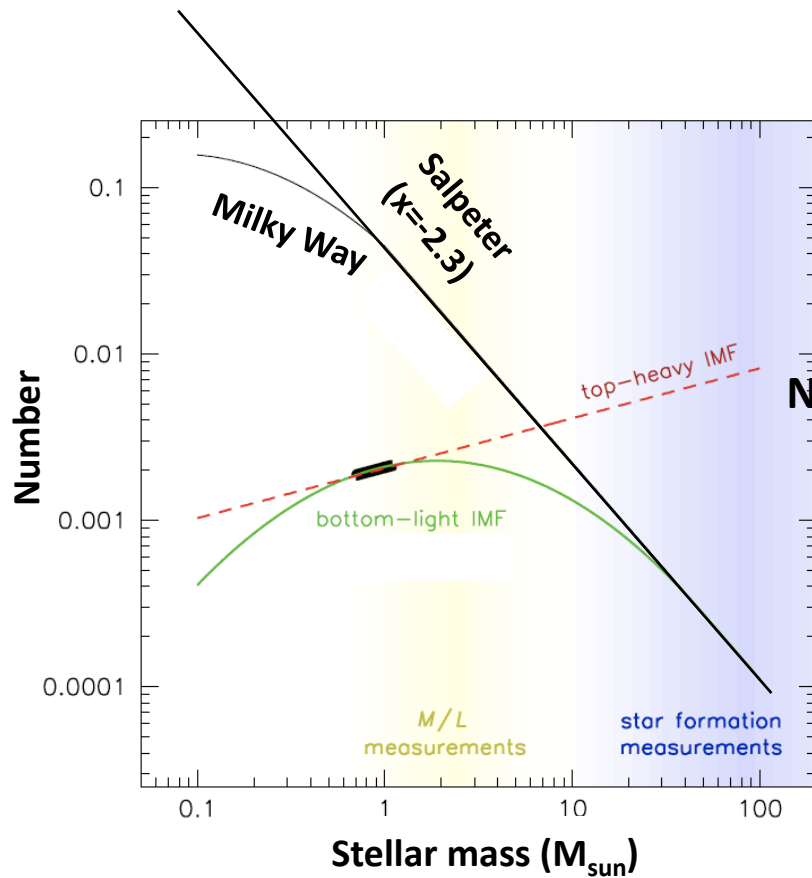
Counting Low-Mass Stars in Distant Galaxies

Charlie Conroy
(Harvard/CfA)

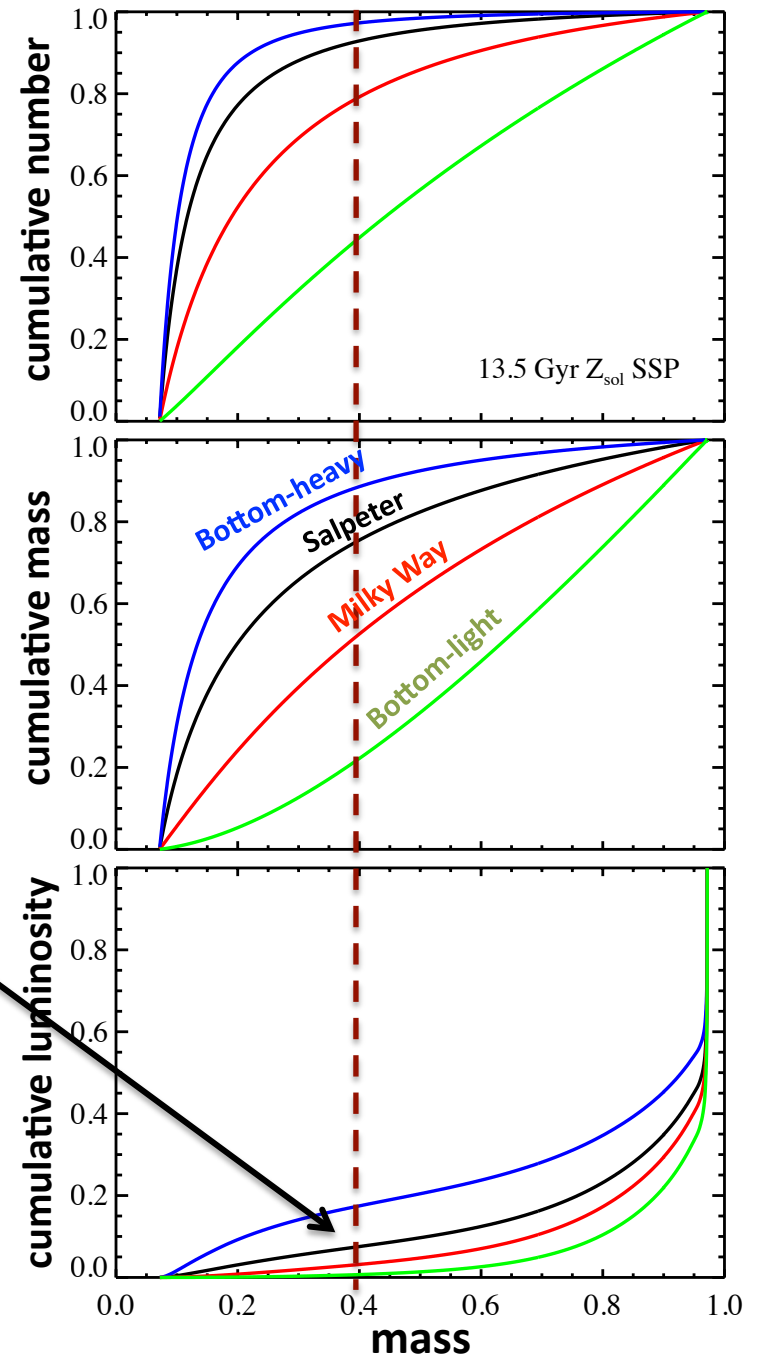
In collaboration with Pieter van Dokkum (Yale)

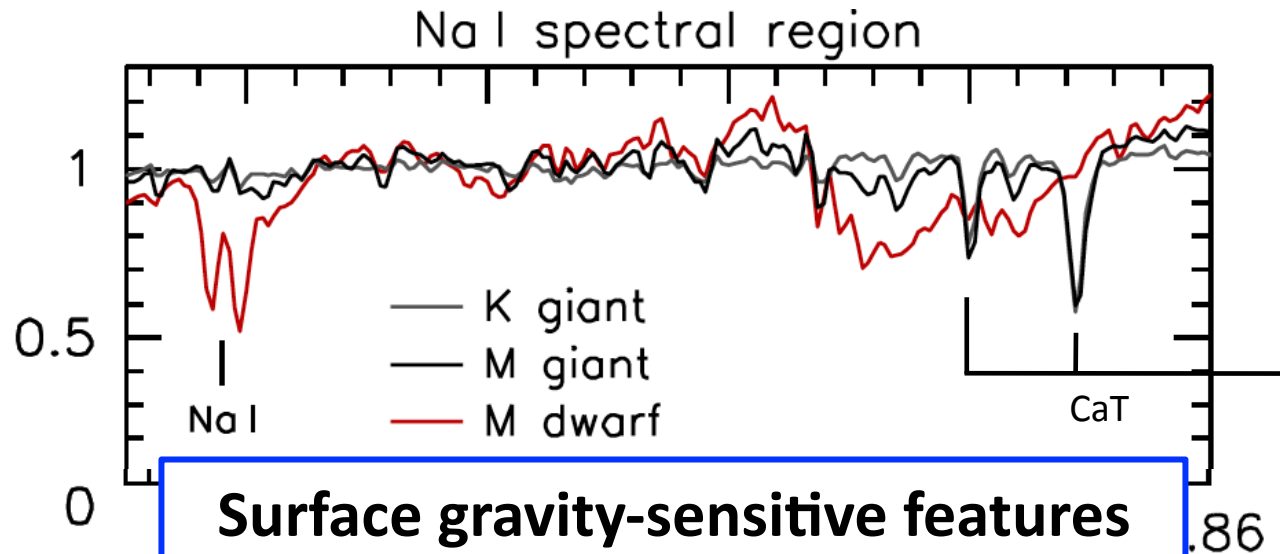
The IMF in Integrated Light

- Low-mass stars dominate the mass, but are “invisible”

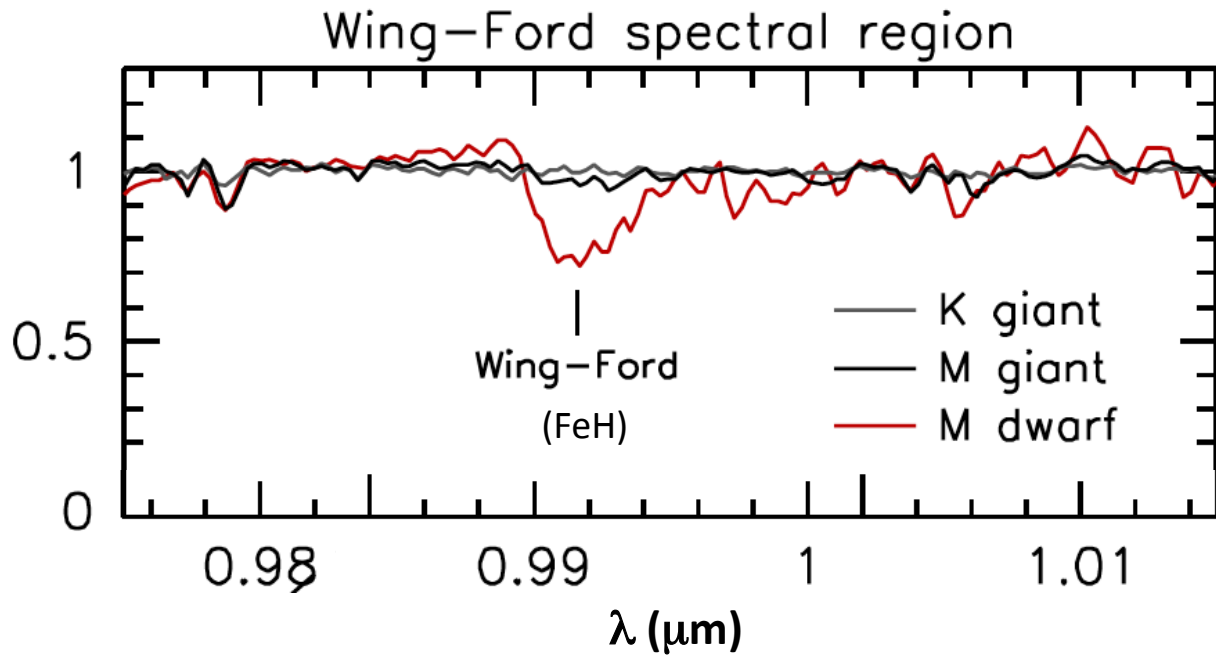


Not exactly!



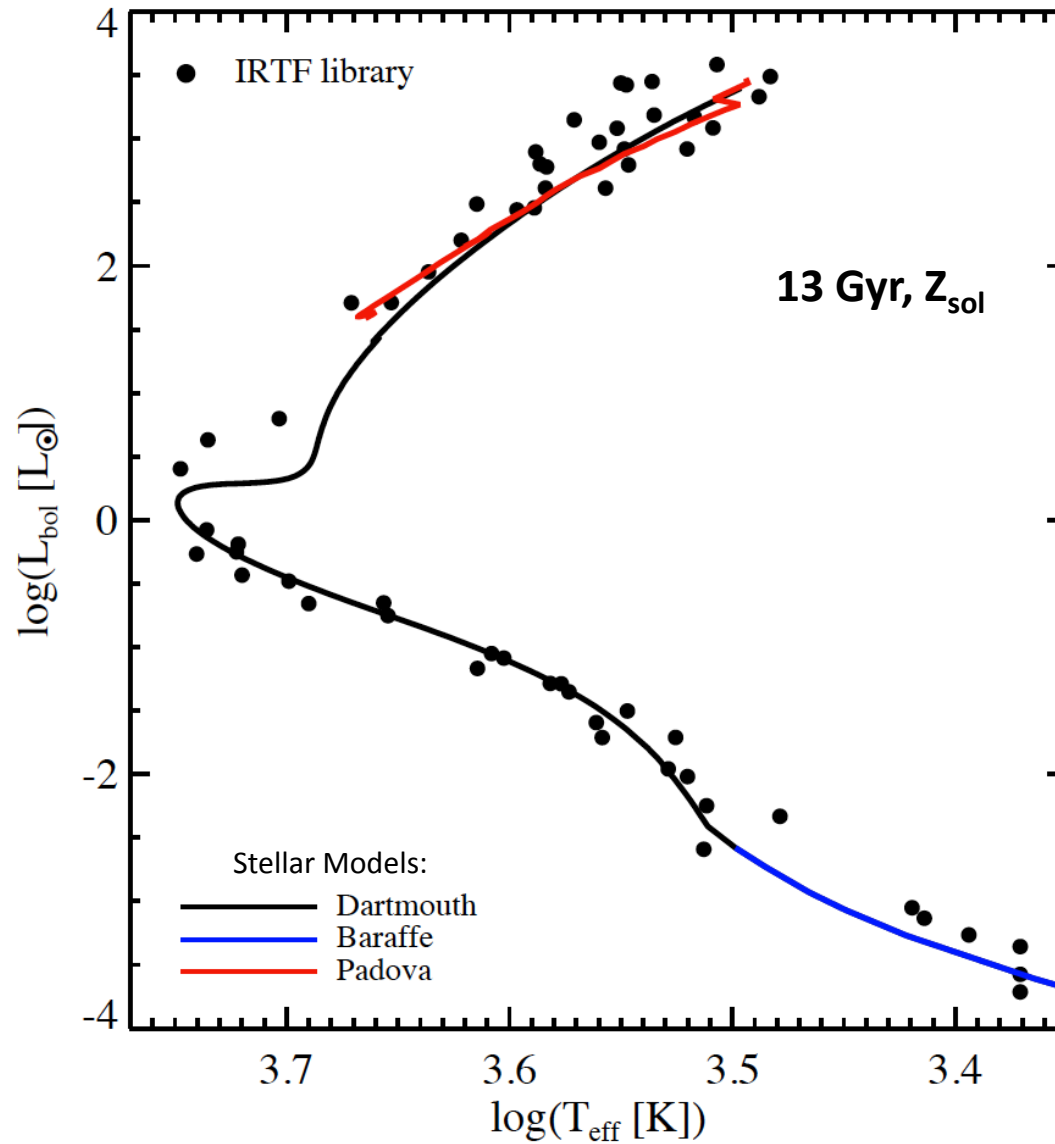


Surface gravity-sensitive features separate dwarfs from giants

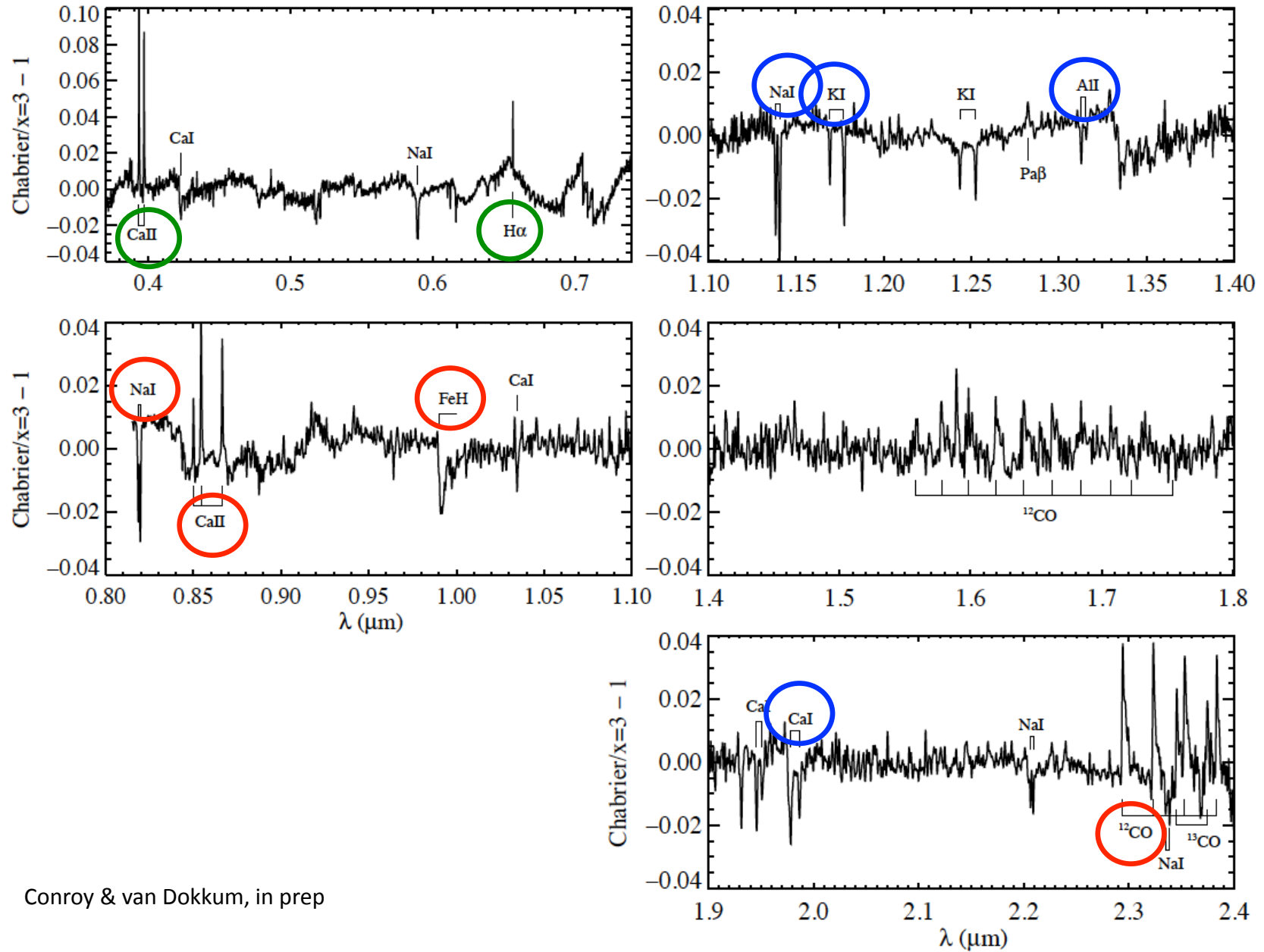


Spinrad 1962
 Wing & Ford 1969
 Cohen 1978
 Faber & French 1980
 Carter et al. 1986
 Hardy & Couture 1988
 Schiavon et al. 2000
 van Dokkum & Conroy 2010

Stellar Population Synthesis



New Empirical Models

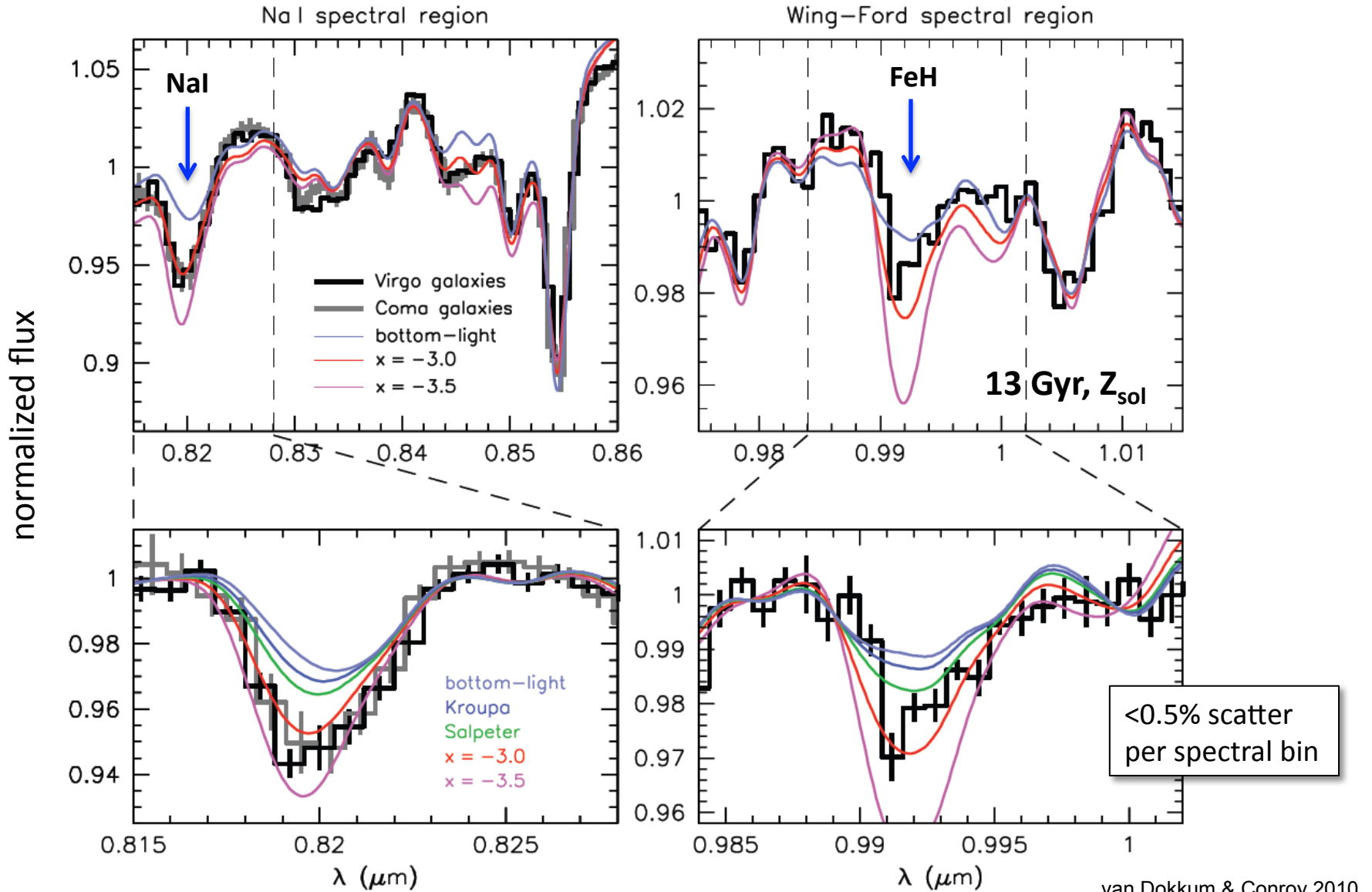


Conroy & van Dokkum, in prep

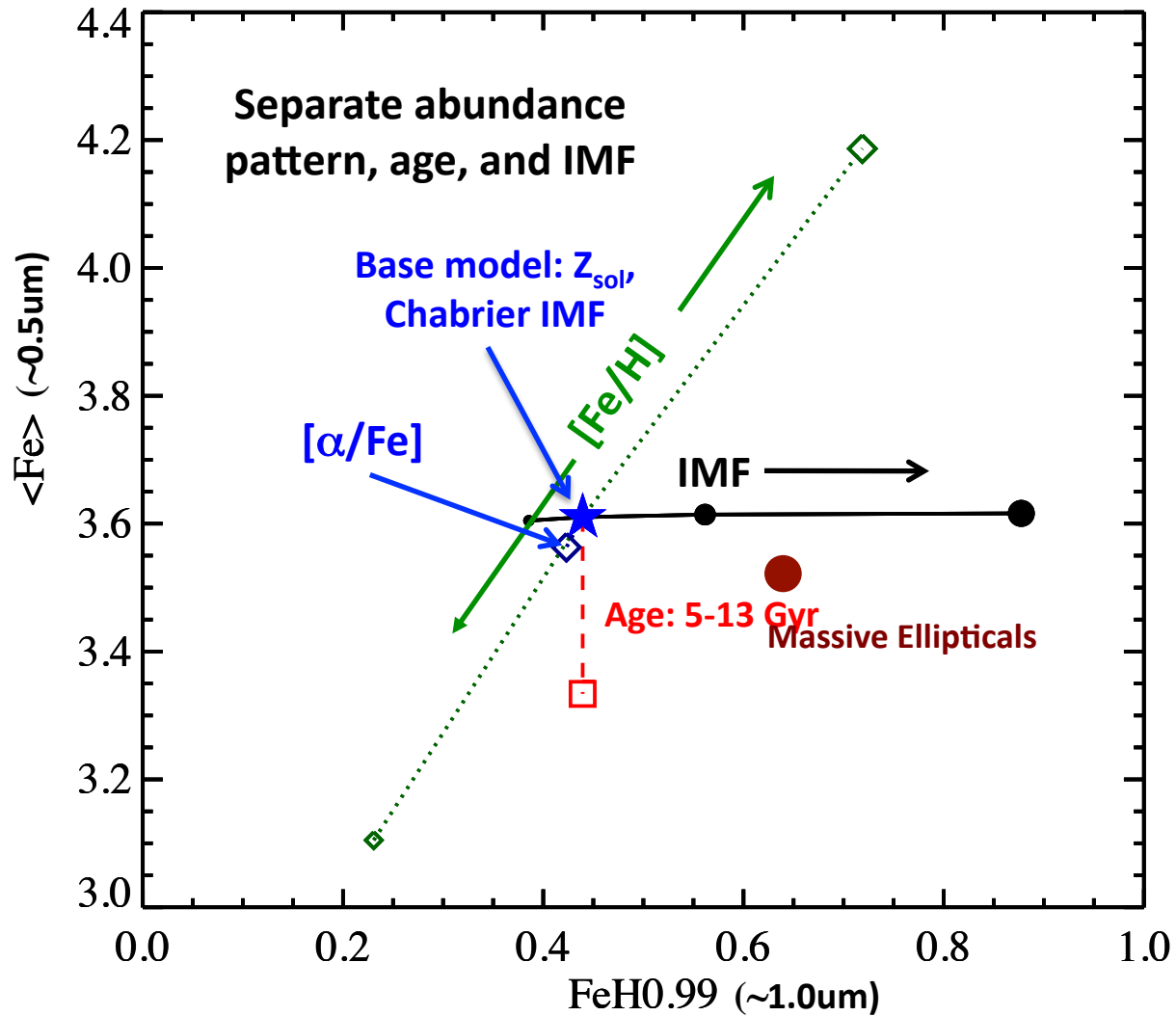
- Keck LRIS spectra of the 8 most massive ($\sigma > 250$ km/s) Es in Coma & Virgo (excluding M87)

only 12m exposure per galaxy

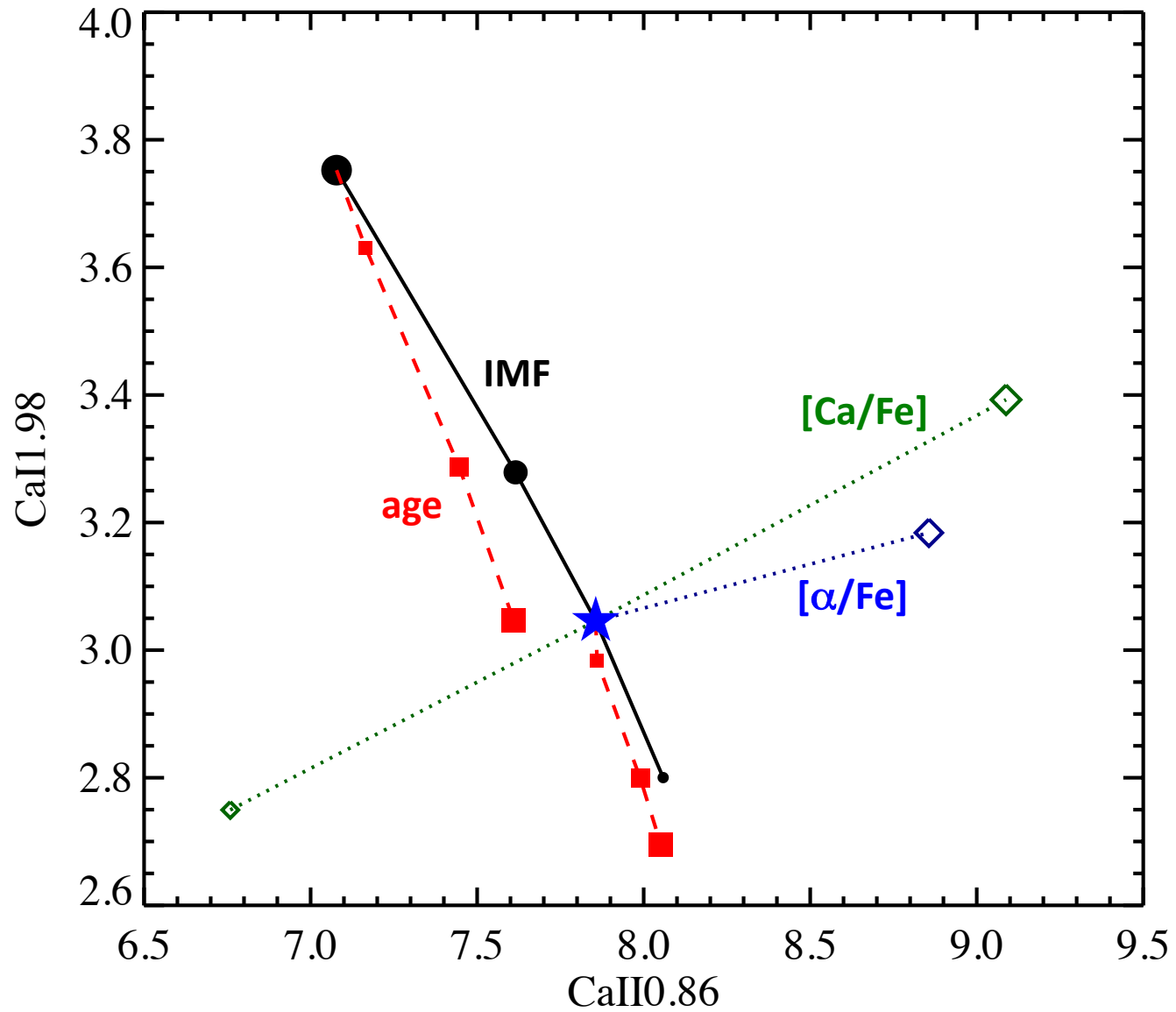
spectra obtained within the central $4'' = 0.6 R_e$ (Coma), $0.02 R_e$ (Virgo)



Models with Arbitrary Abundance Patterns

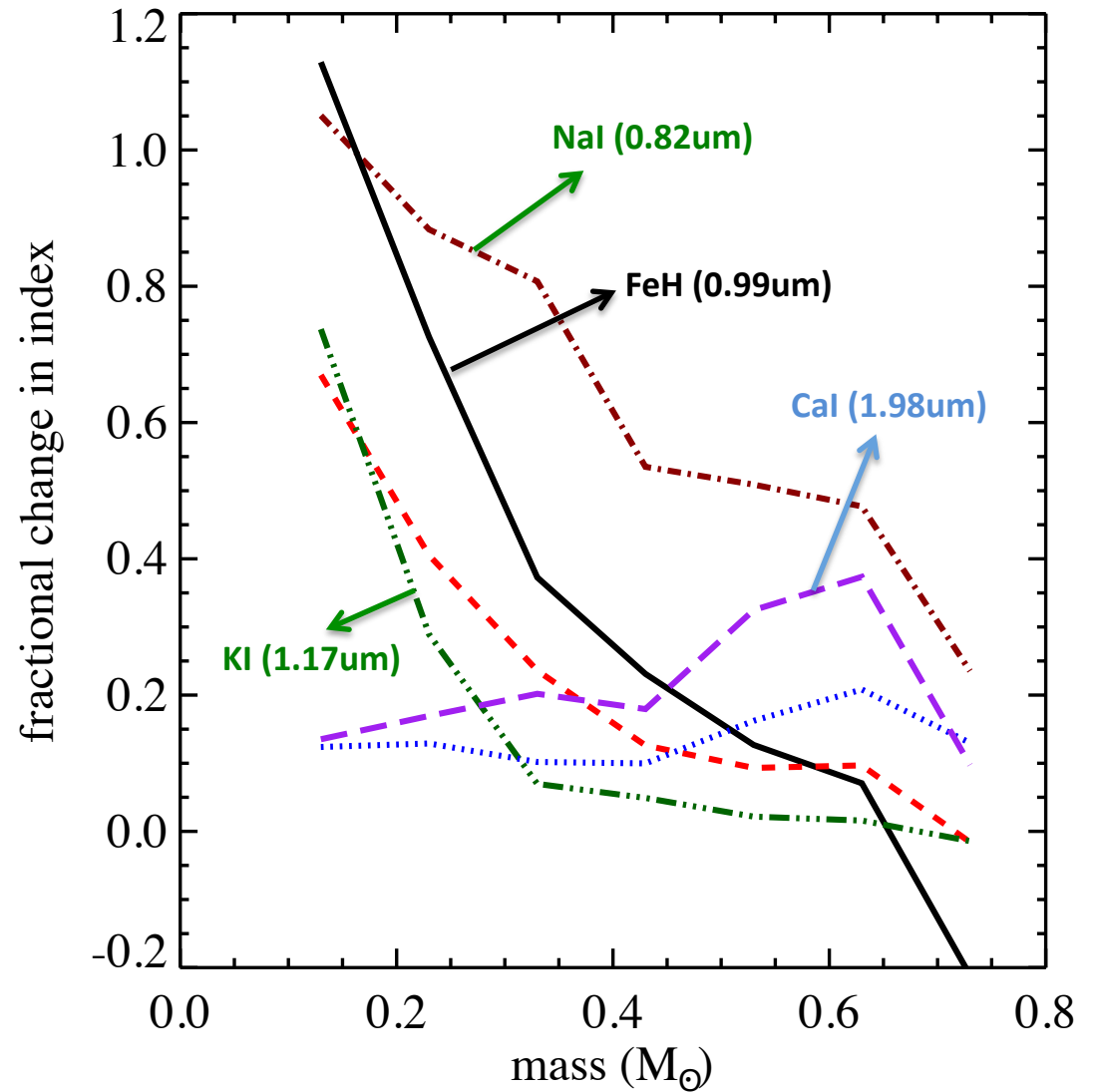


Calcium, sodium, carbon, ...



Constraining the *shape* of the IMF

- Spectral features are sensitive to different mass intervals



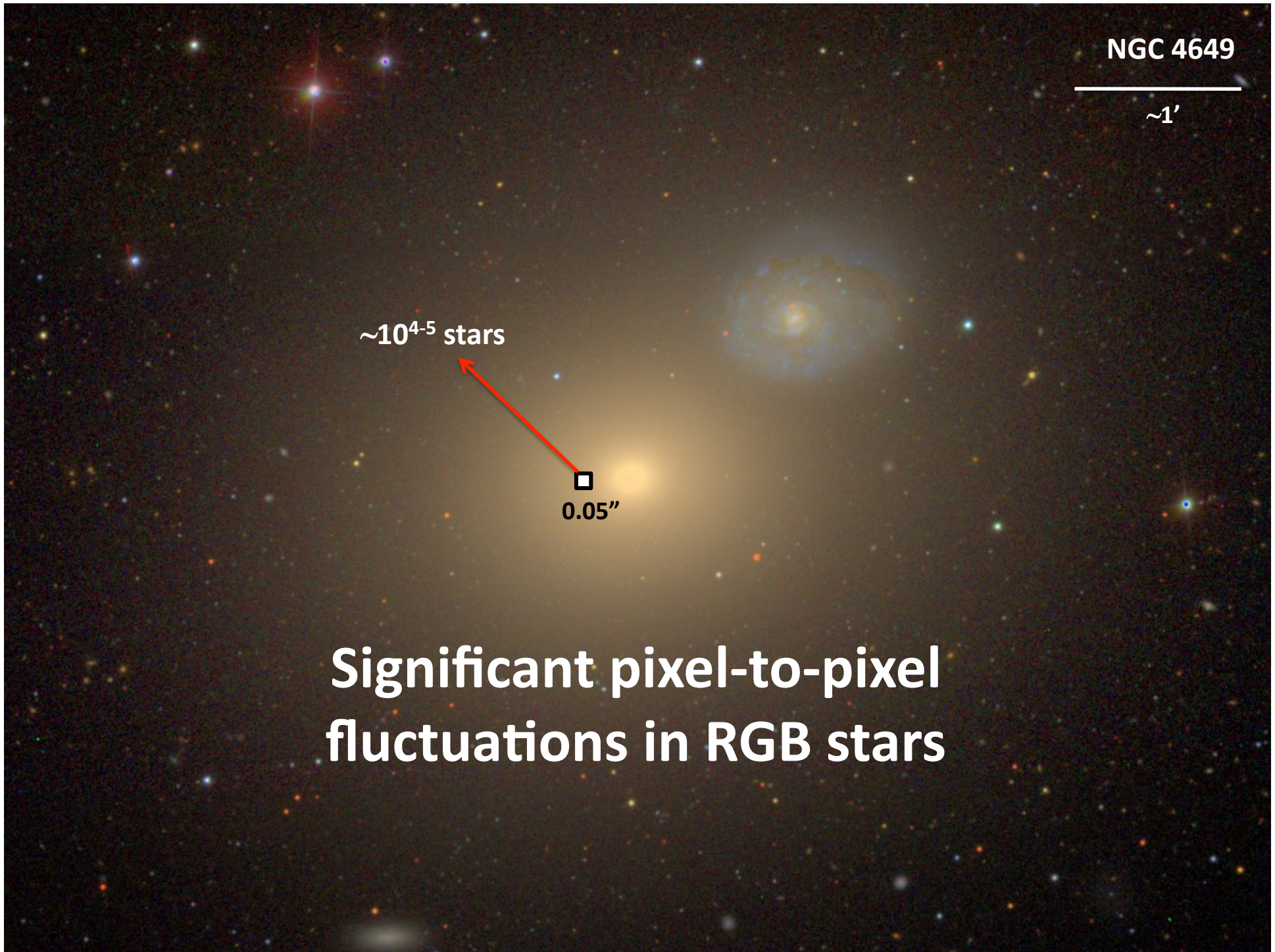
NGC 4649

~1'

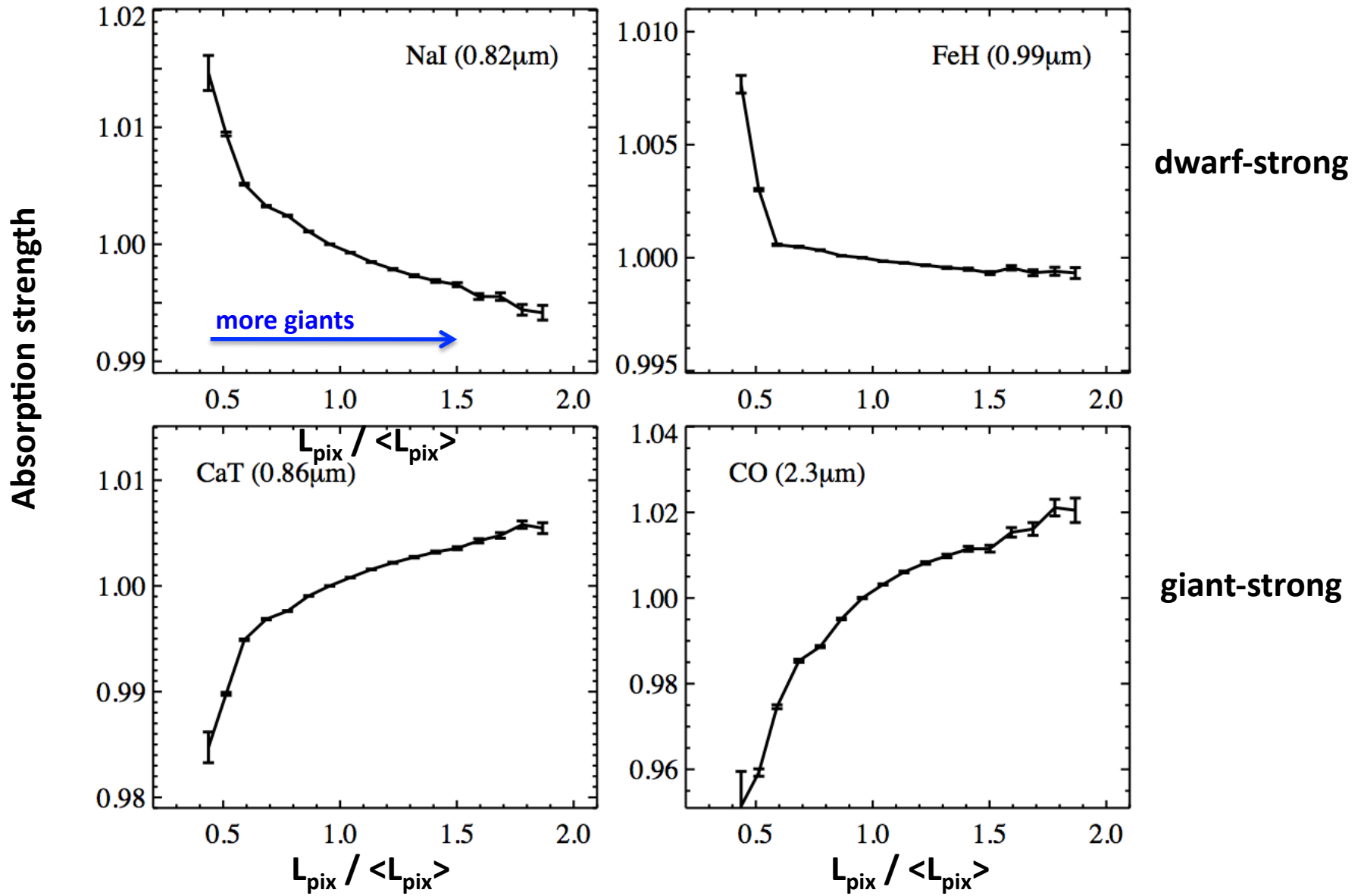
~ 10^{4-5} stars

0.05"

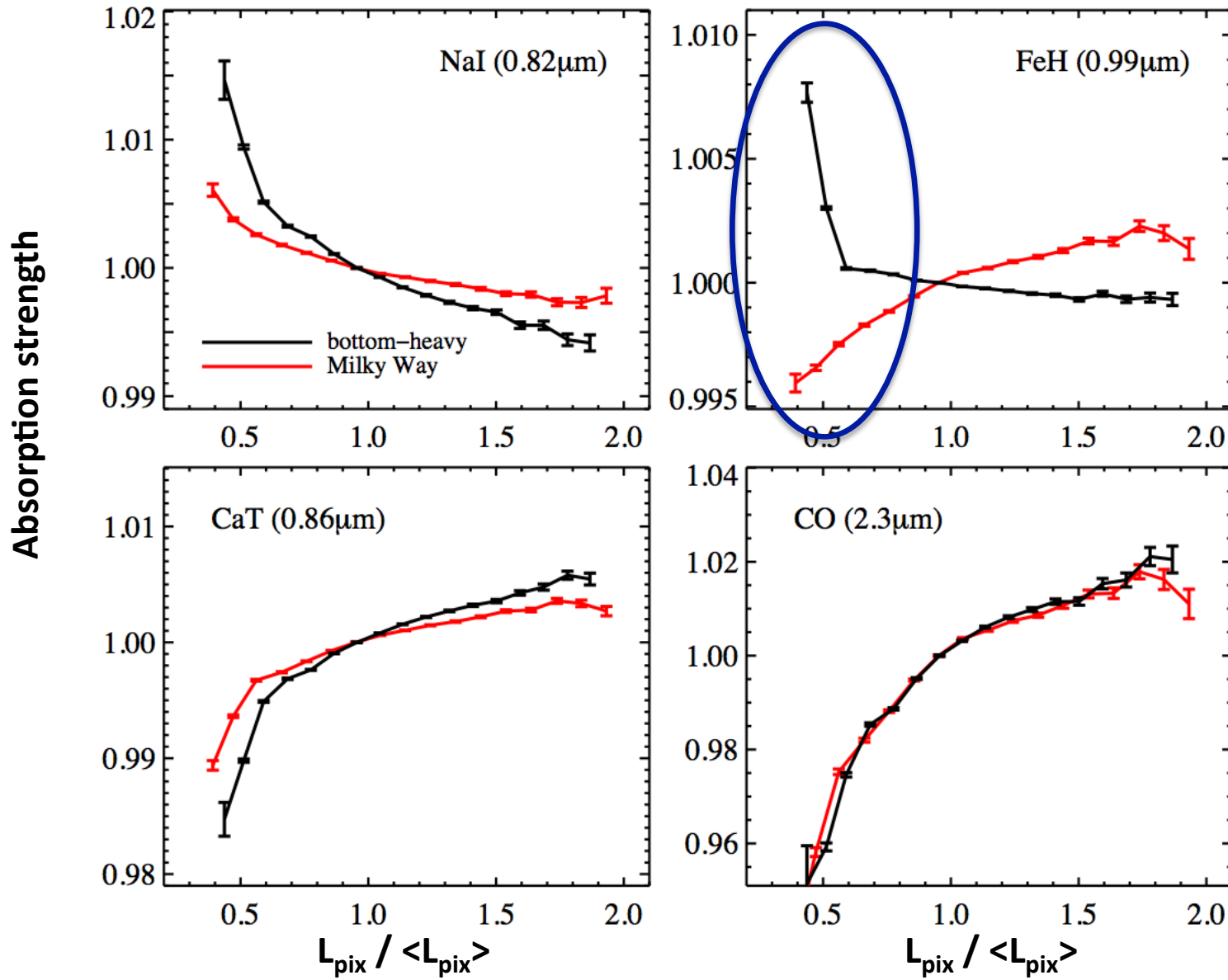
Significant pixel-to-pixel
fluctuations in RGB stars



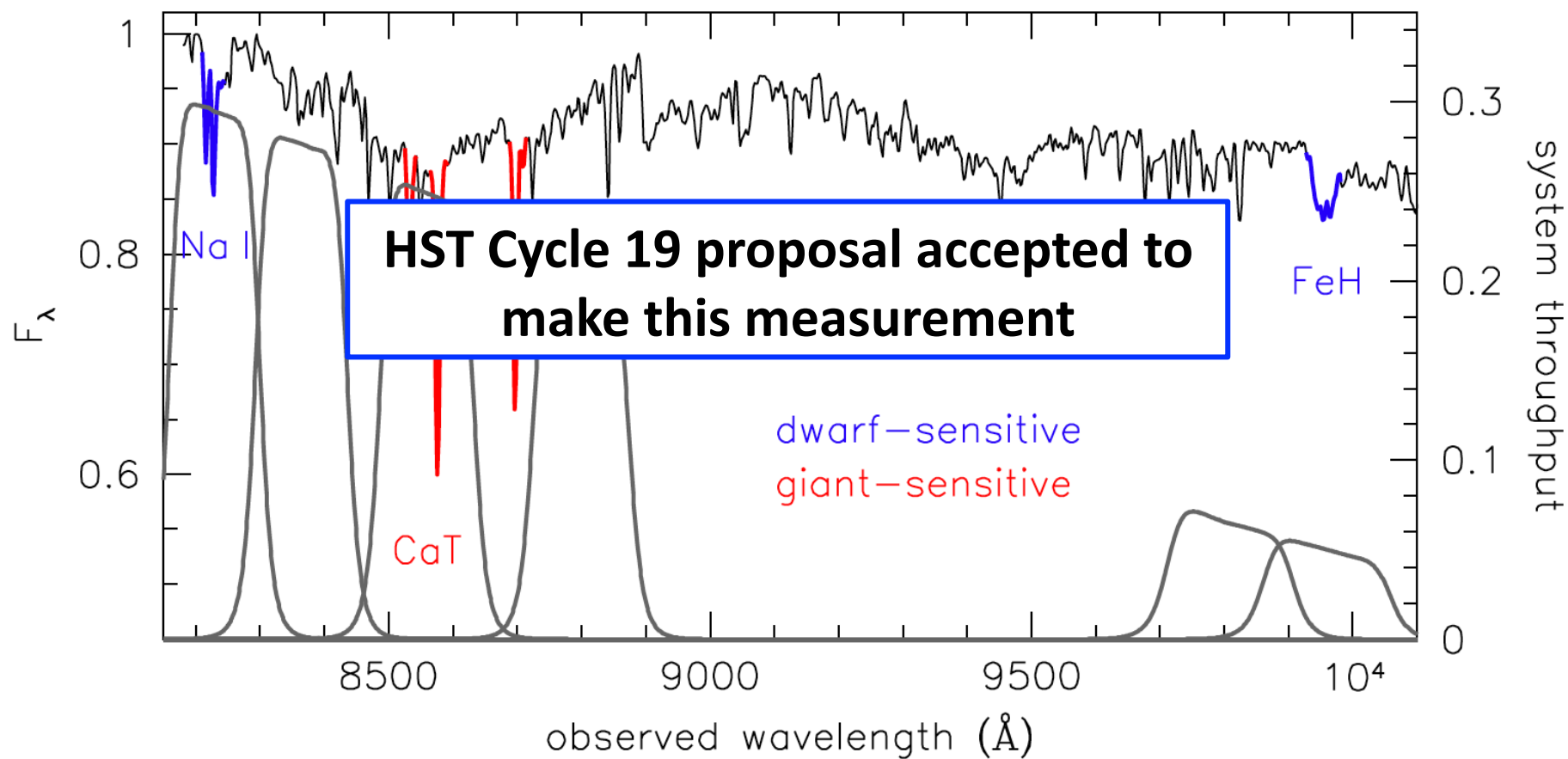
Dwarfs vs. Giants



... & the IMF



HST narrow-band tunable filters:



Summary

1. *The low-mass IMF can be directly constrained from the integrated light of old stellar populations*
 - Even the *shape* of the IMF can be measured
2. Spectral fluctuations is a novel technique for measuring the IMF
3. Bottom-heavy IMF still favored for massive ellipticals.