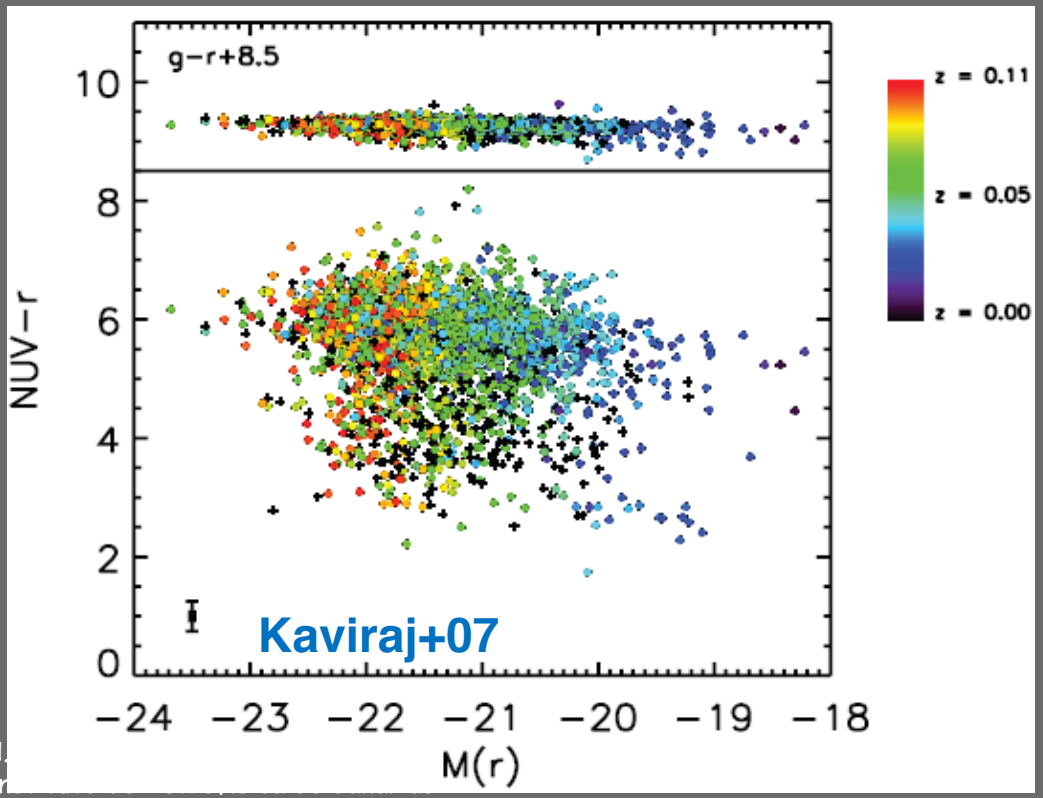
INSTITUTO DE ASTROFÍSICA DE CANARIAS

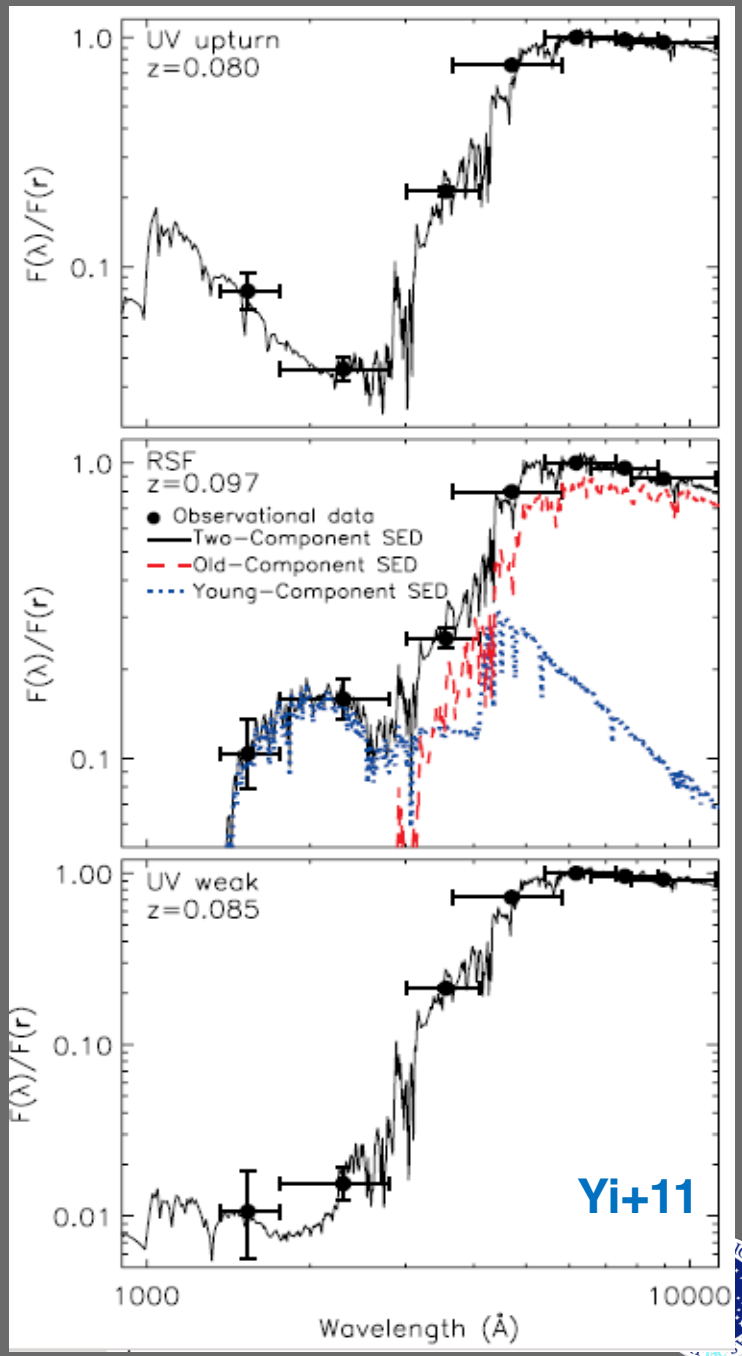
Alexandre Vazdekis
M. Koleva, E. Ricciardelli, Falcón-Barroso

Stellar populations model predictions in the UV spectral range

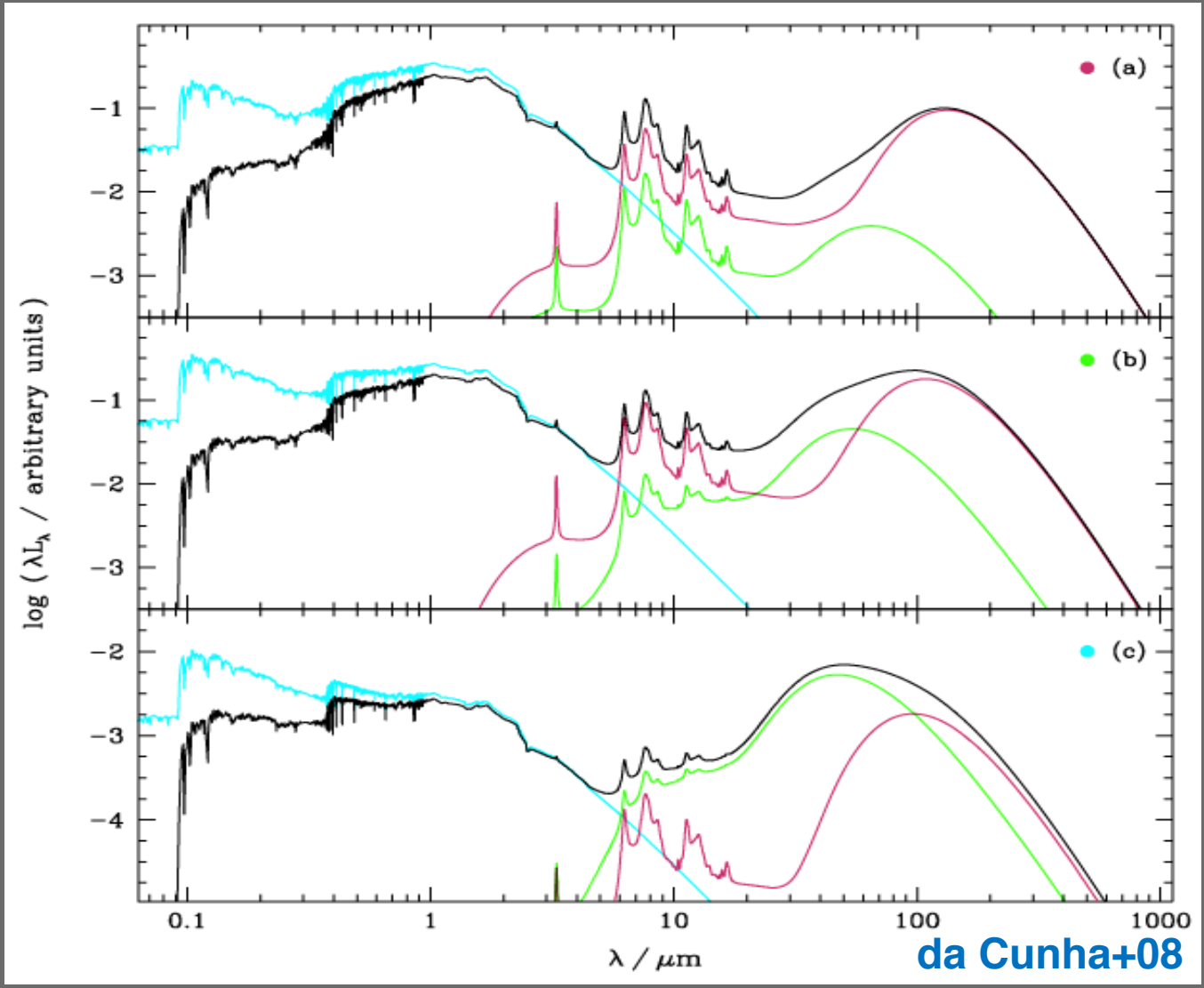
The UV spectral range

- The youngest stellar contributions show up
- The CMR and other scaling relations do scatter
- UV upturn





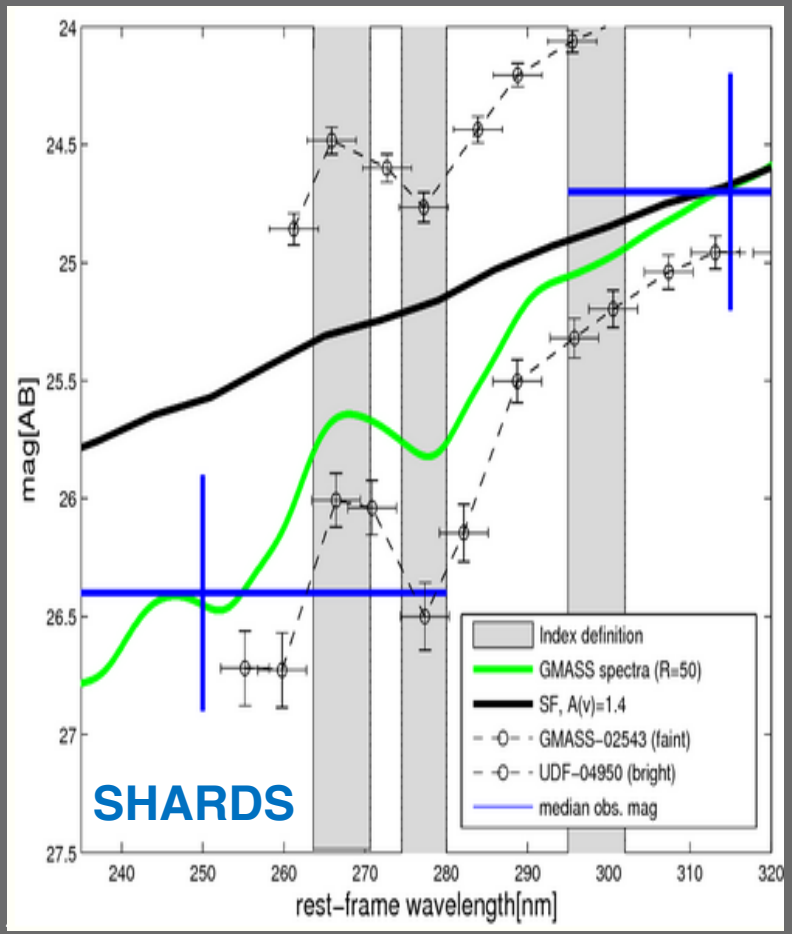
- **Dust effects:**

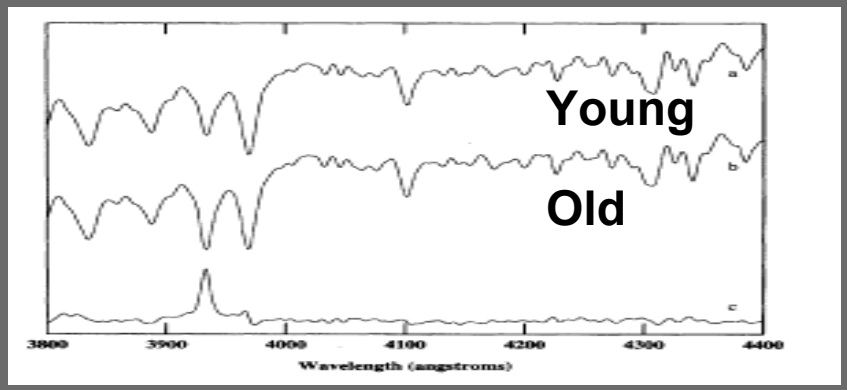


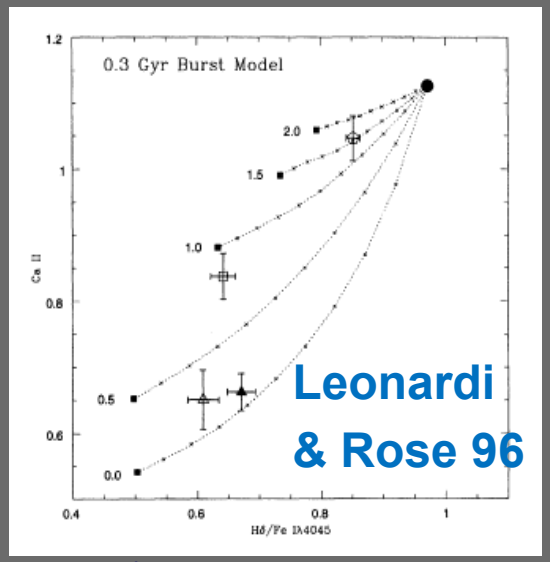
A. Vazdekis
Instituto de Astrofísica de Canarias

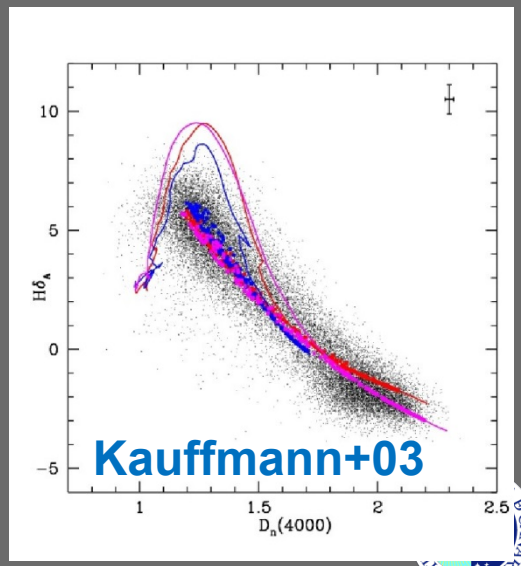
The UV spectral range

- Promising, unexploited, indices observed at high redshift
- Separate stellar components: break burst-age burst-strength degeneracy via specific line-strength diagnostic diagrams



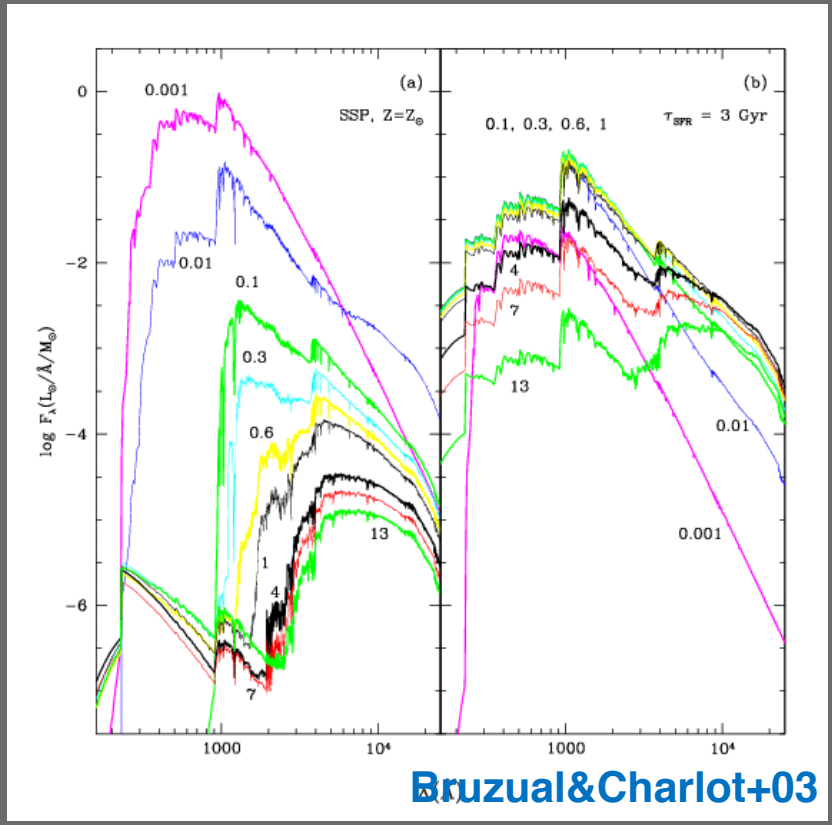






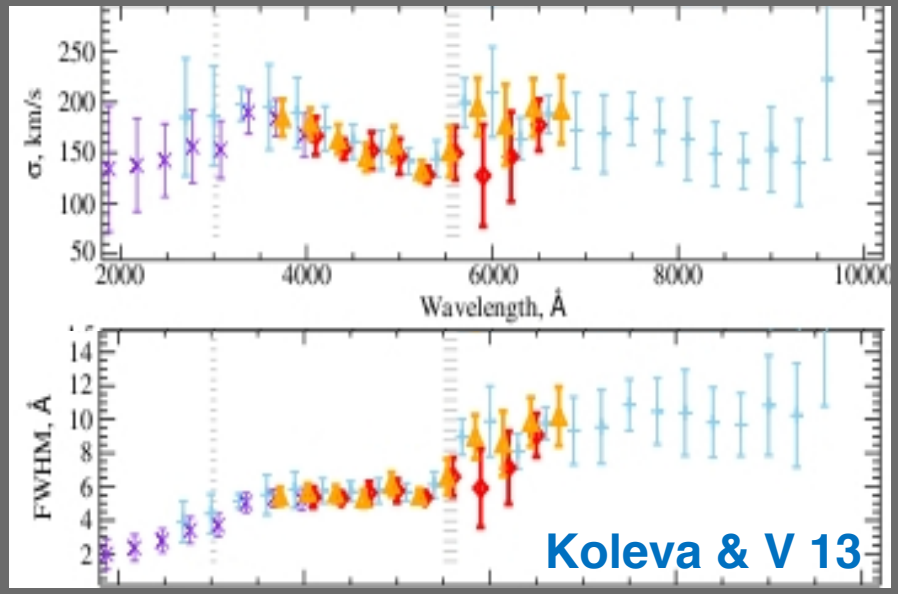
The UV spectral range

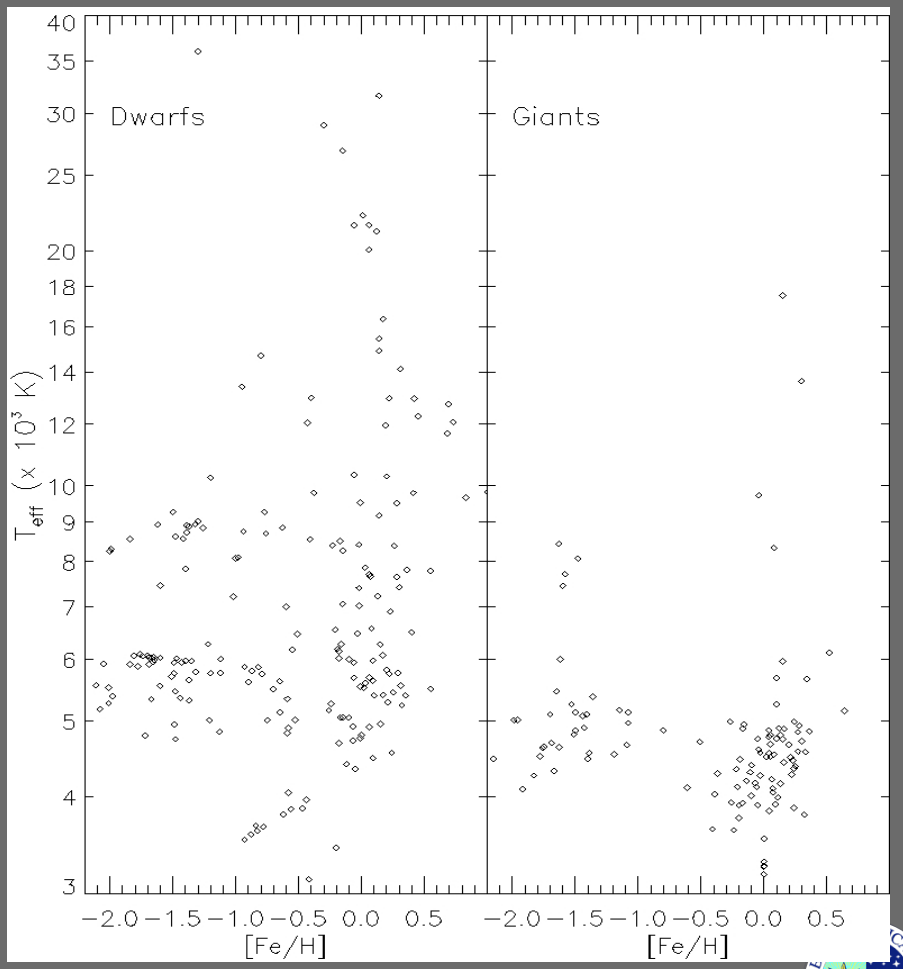
There is a lack of models predicting SEDs at moderately high spectral resolution although there are some predictions based on theoretical stellar libraries at low spectral resolution or empirical but limited to solar metallicity (IUE stellar library).



NGSL

- HST-based library (378 stars observed with 3 gratings) (Gregg+06)
- Spectral range: 1700-10000Å. FWHM: 3-10Å.
- Stellar spectra characterization (with full spectrum fitting ULySS):



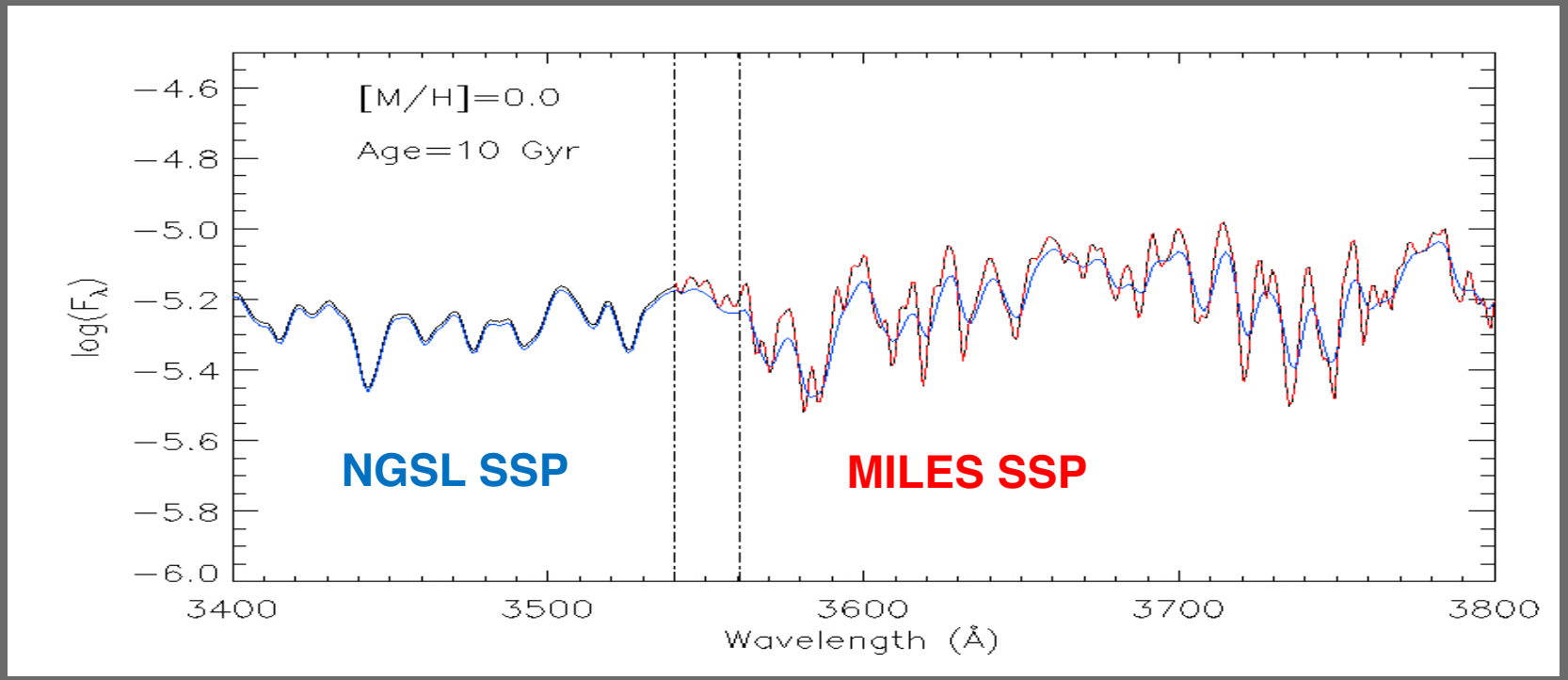


- Stellar parameters:
  - Homogenized with MILES library
  - Lack of metal-poor giants: i.e. only good for the NUV

A. Vazdekis
Instituto de Astrofísica de Canarias

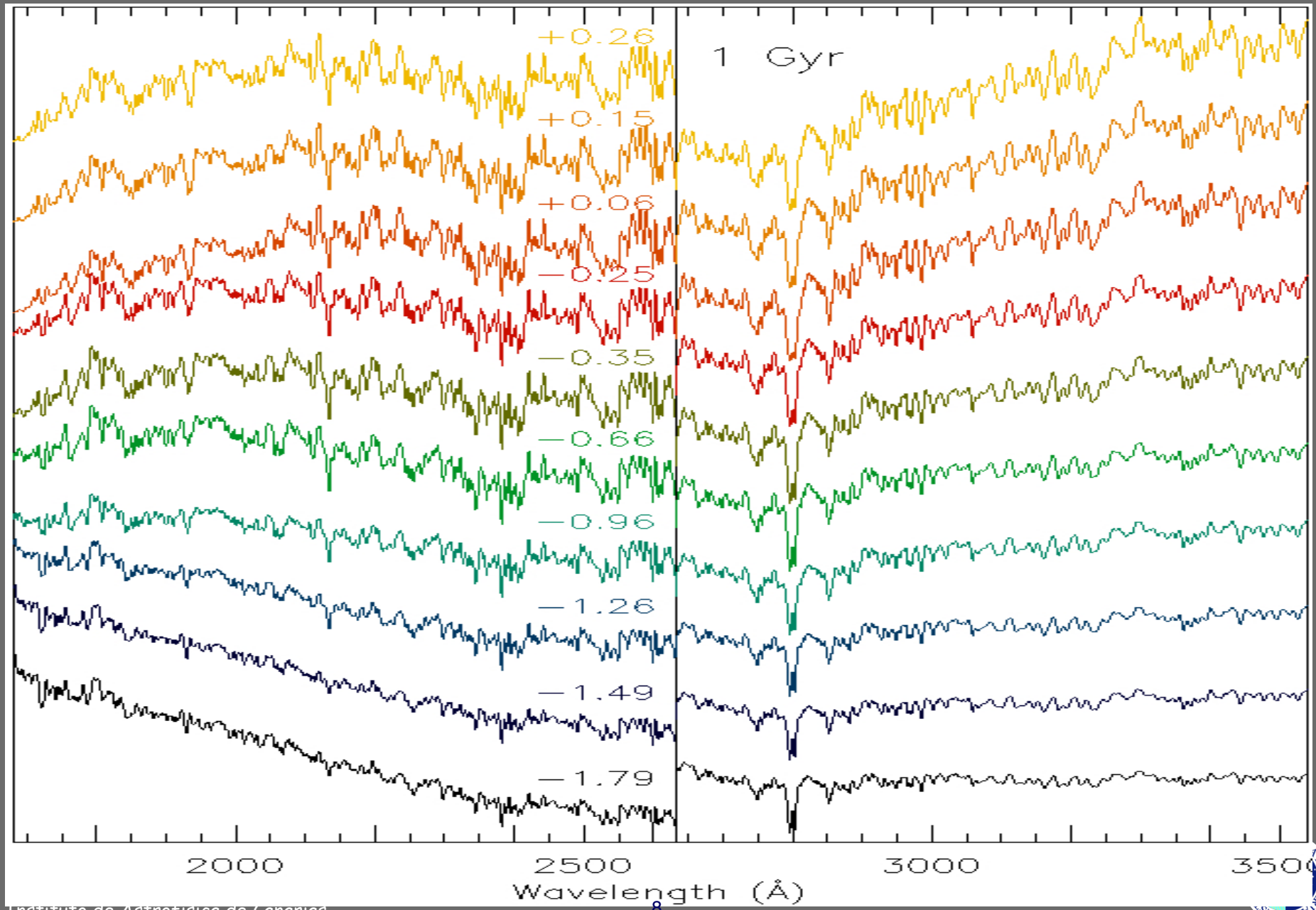
Extended MILES models

- **Join NGSL-based UV models with MILES models:**

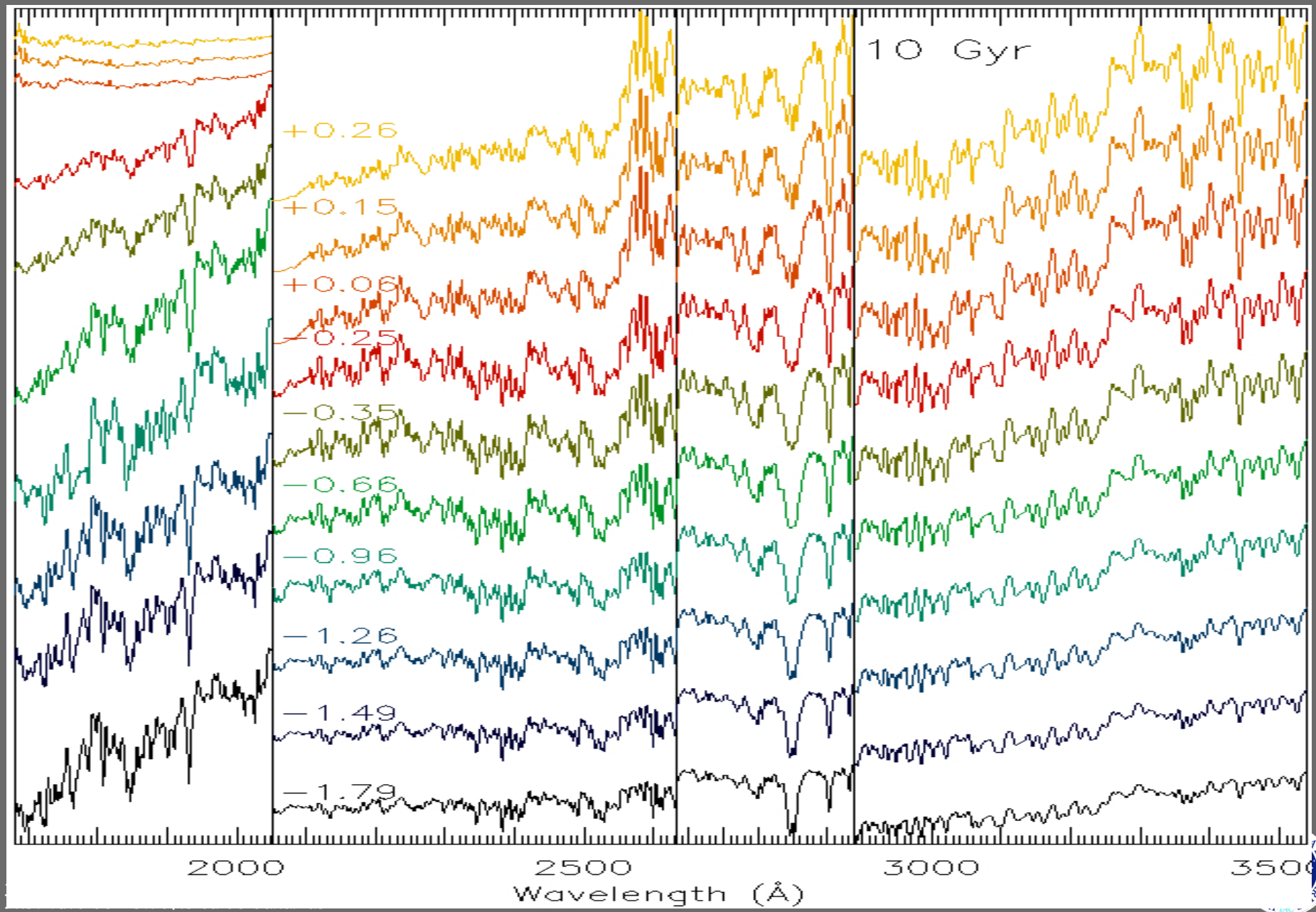


Without applying any correction the two SSP spectra match within < 0.02mag

UV SSP model spectra

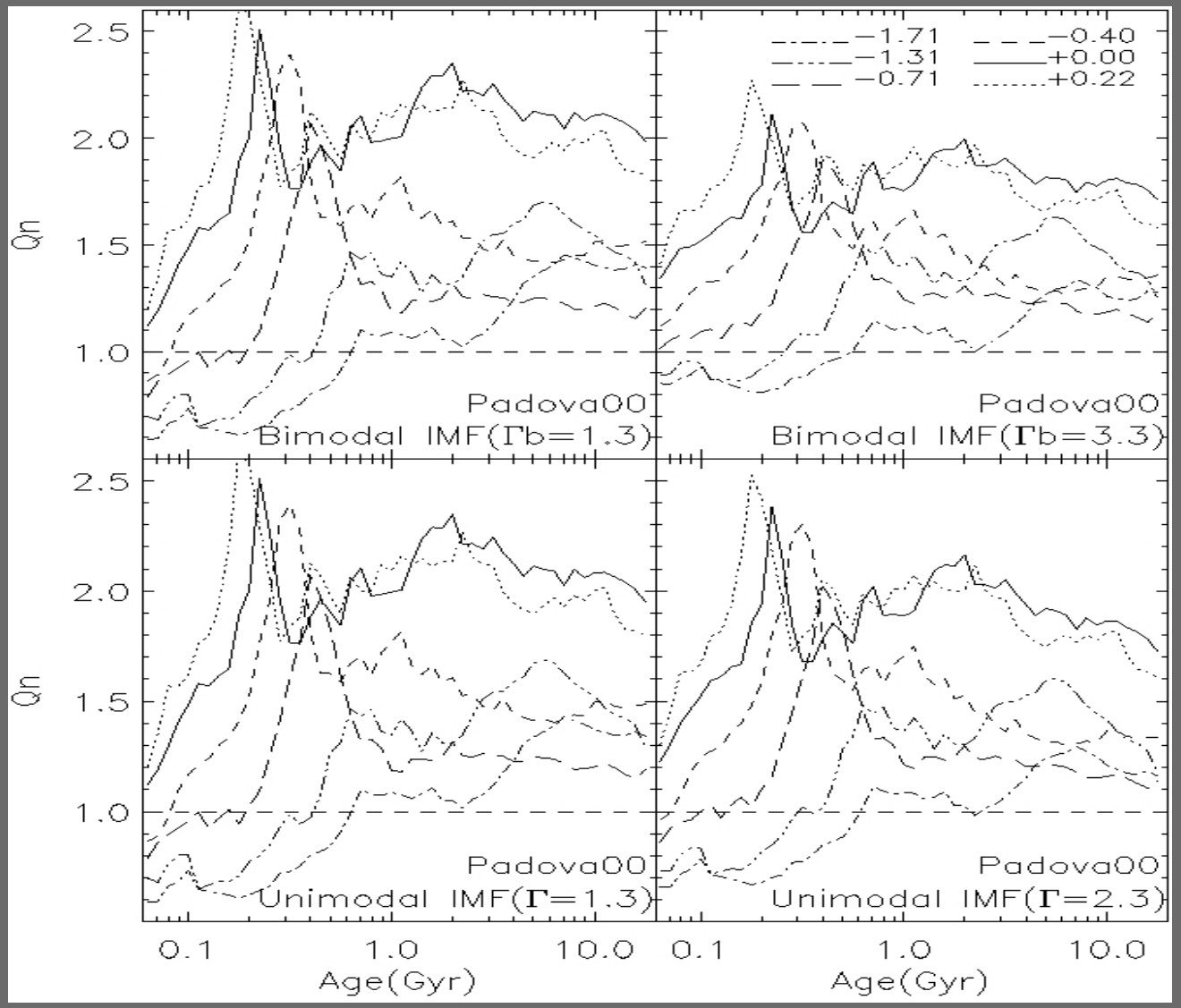


UV SSP model spectra



Quality:

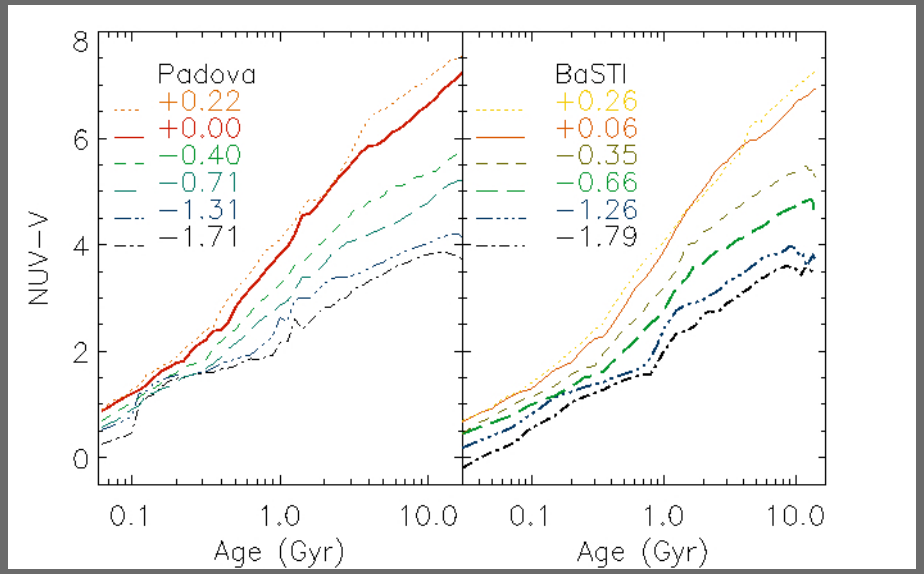
Qn parameter, which depends on density of stars (it should be > 1):



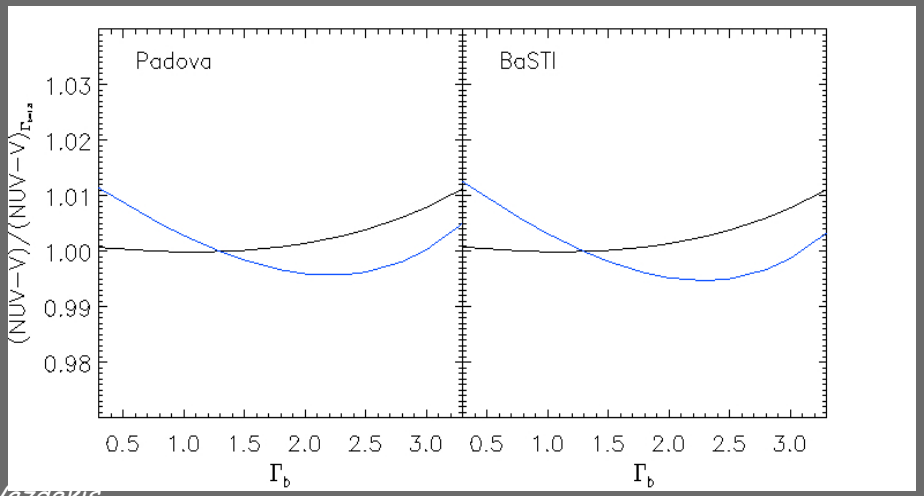
A. Vazdekis
Instituto de Astrofísica de Canarias

Model colours

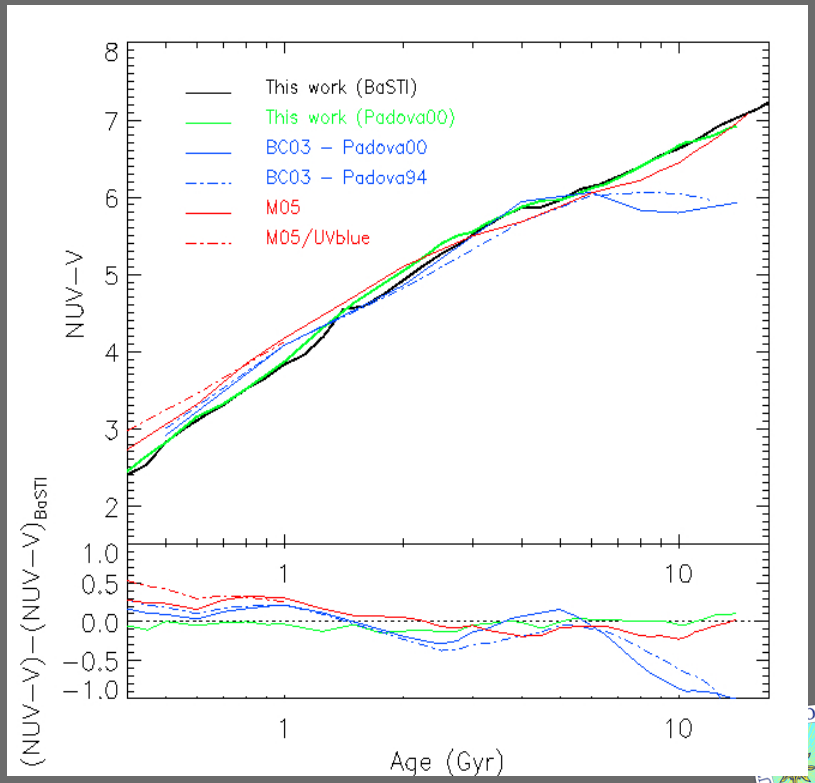
Dependence on age/meallicity (higher sensitivity to age than in the optical):



IMF effect (negligible):

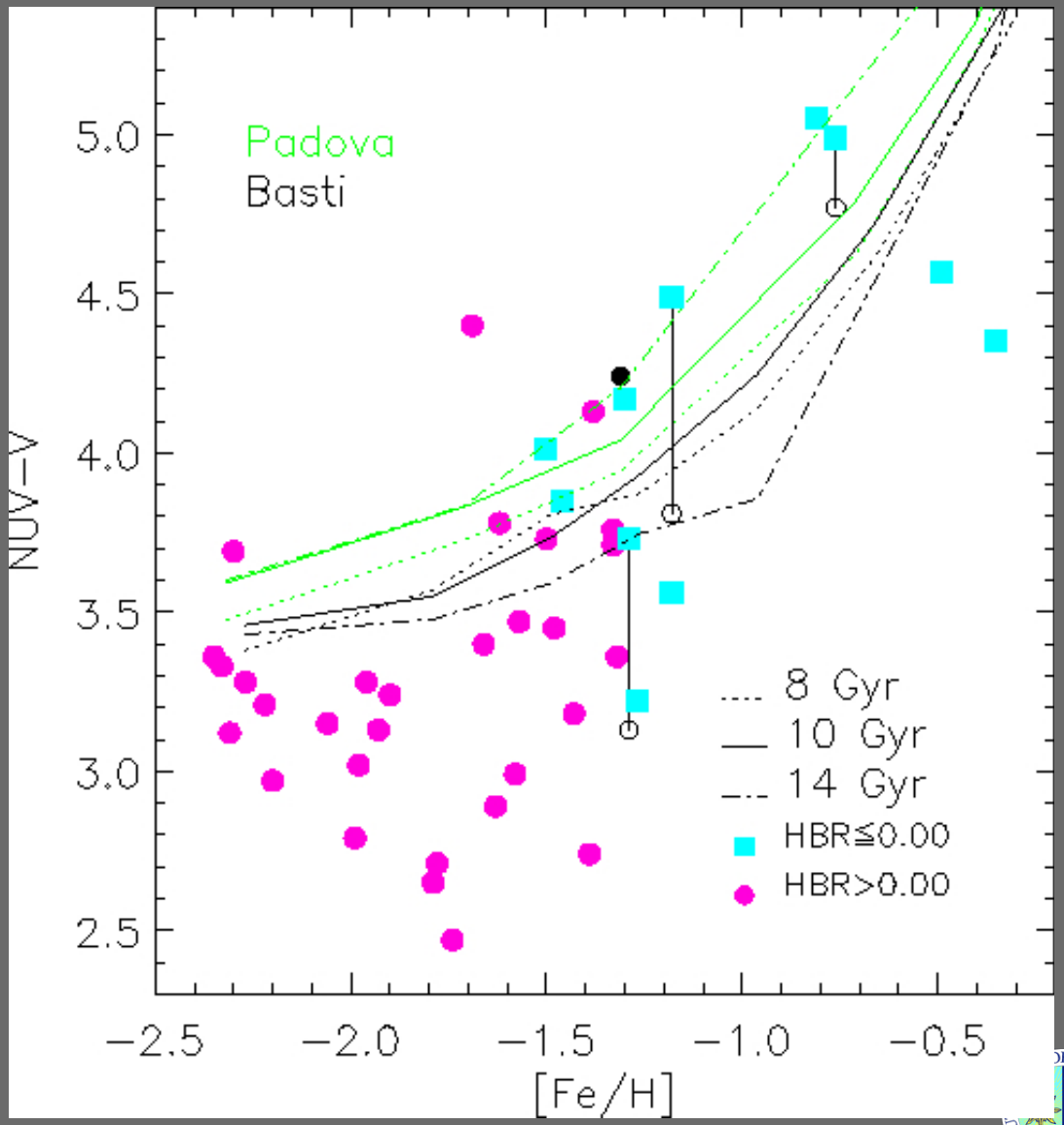


➢ **Comparison to other models:**



MW globular clusters

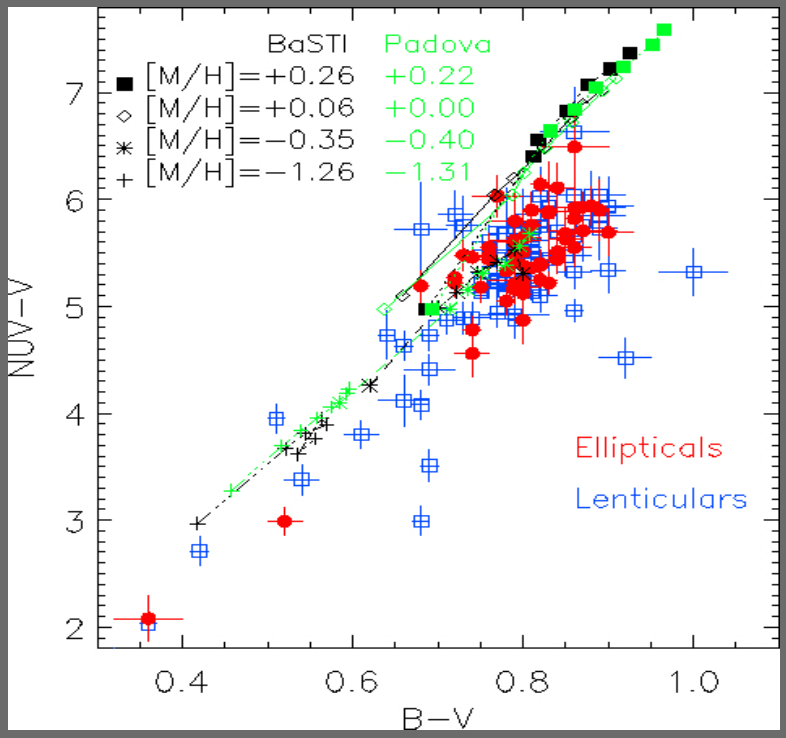
- Metal-rich globs well fitted
- Intermediate-metallicity clusters fits depend on HB morphology
- Metal-poor clusters require bluer HB



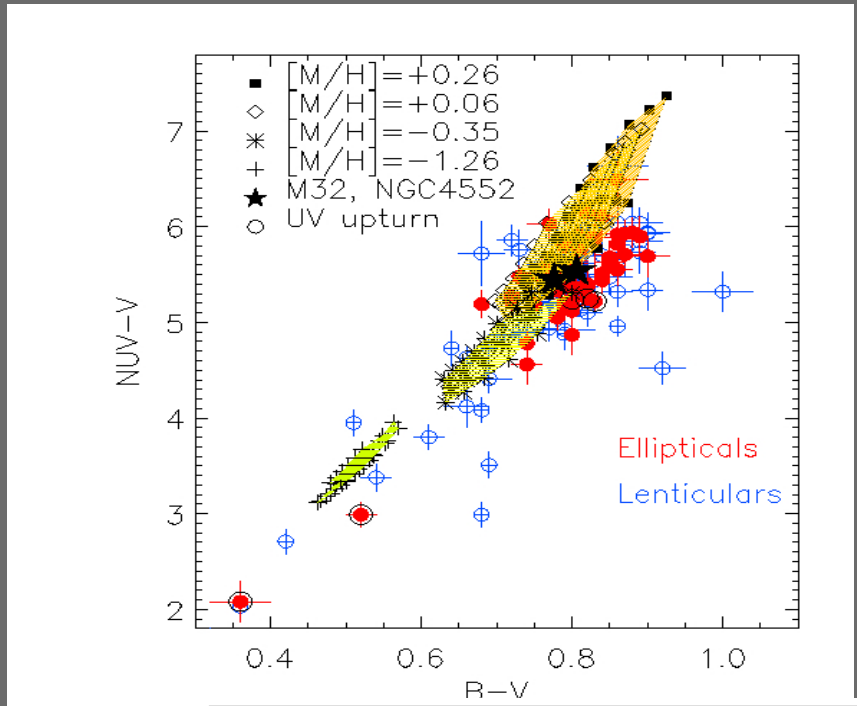
A. Vazdekis
Instituto de Astrofísica de Canarias

Galaxy colours

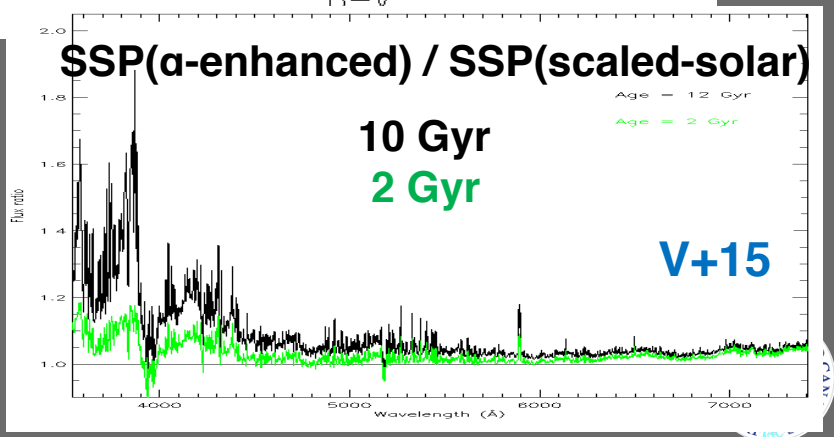
SSP fits of ellipticals and SOs (Donas+07 data):



Old populations with varying 1Gyr contributions:



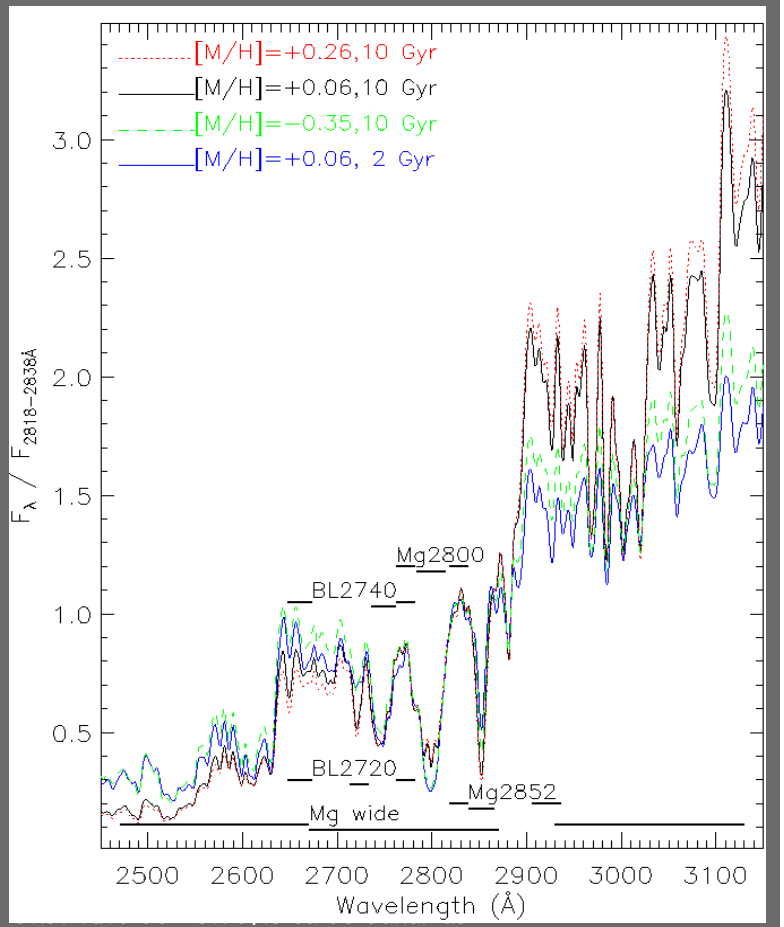
- NUV colours seem to require a small (<5%) contribution of young stellar populations
- UV upturn does not affect significantly NUV colours of UV upturn galaxies
- [α/Fe] abundance ratios?

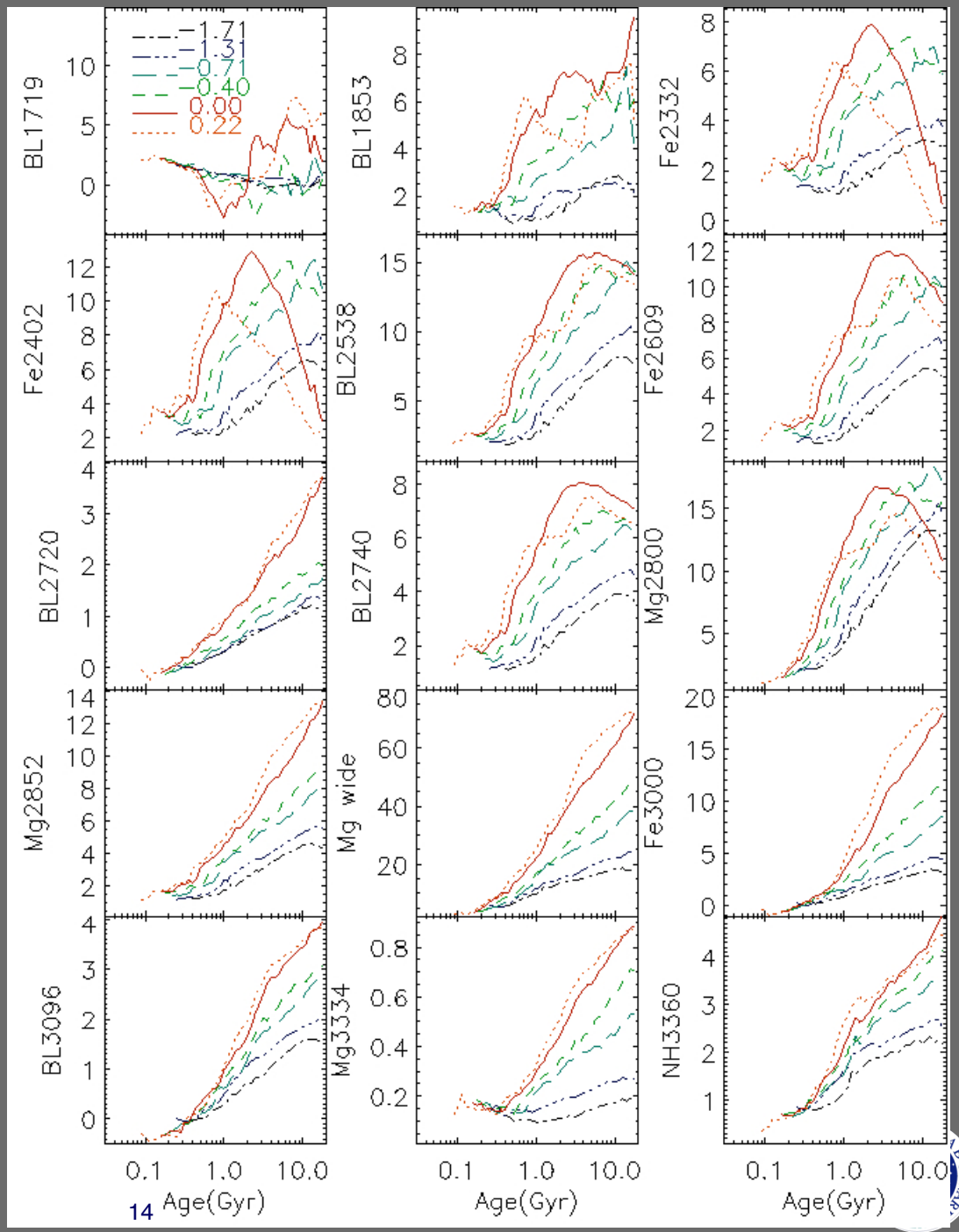


A. Vazdekis
Instituto de Astrofísica de Canarias

UV line-strengths

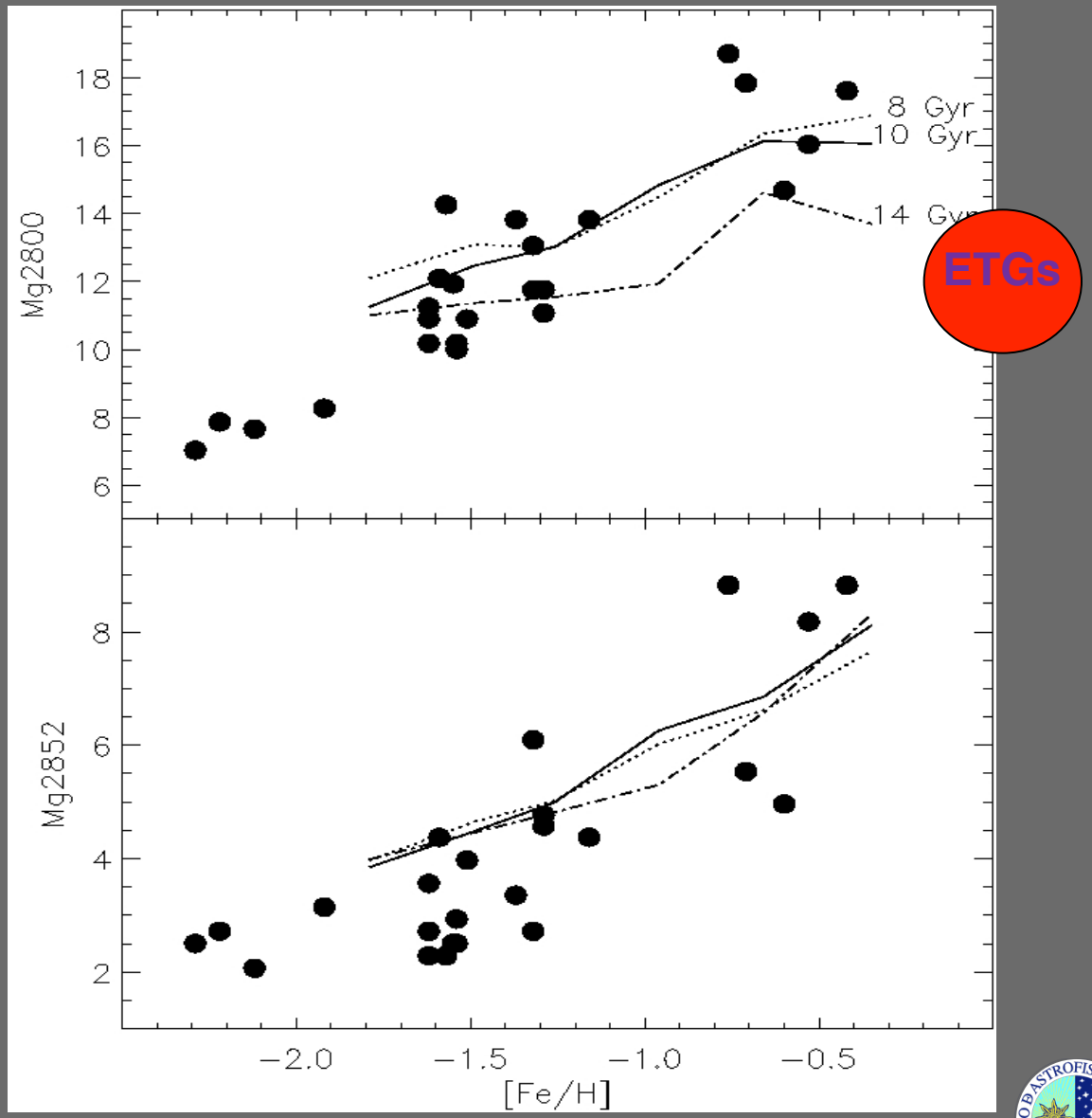
Unlike reddest indices the bluest indices of metal-rich populations tend to peak at intermediate-ages and then decrease for old populations!





UV line-strengths

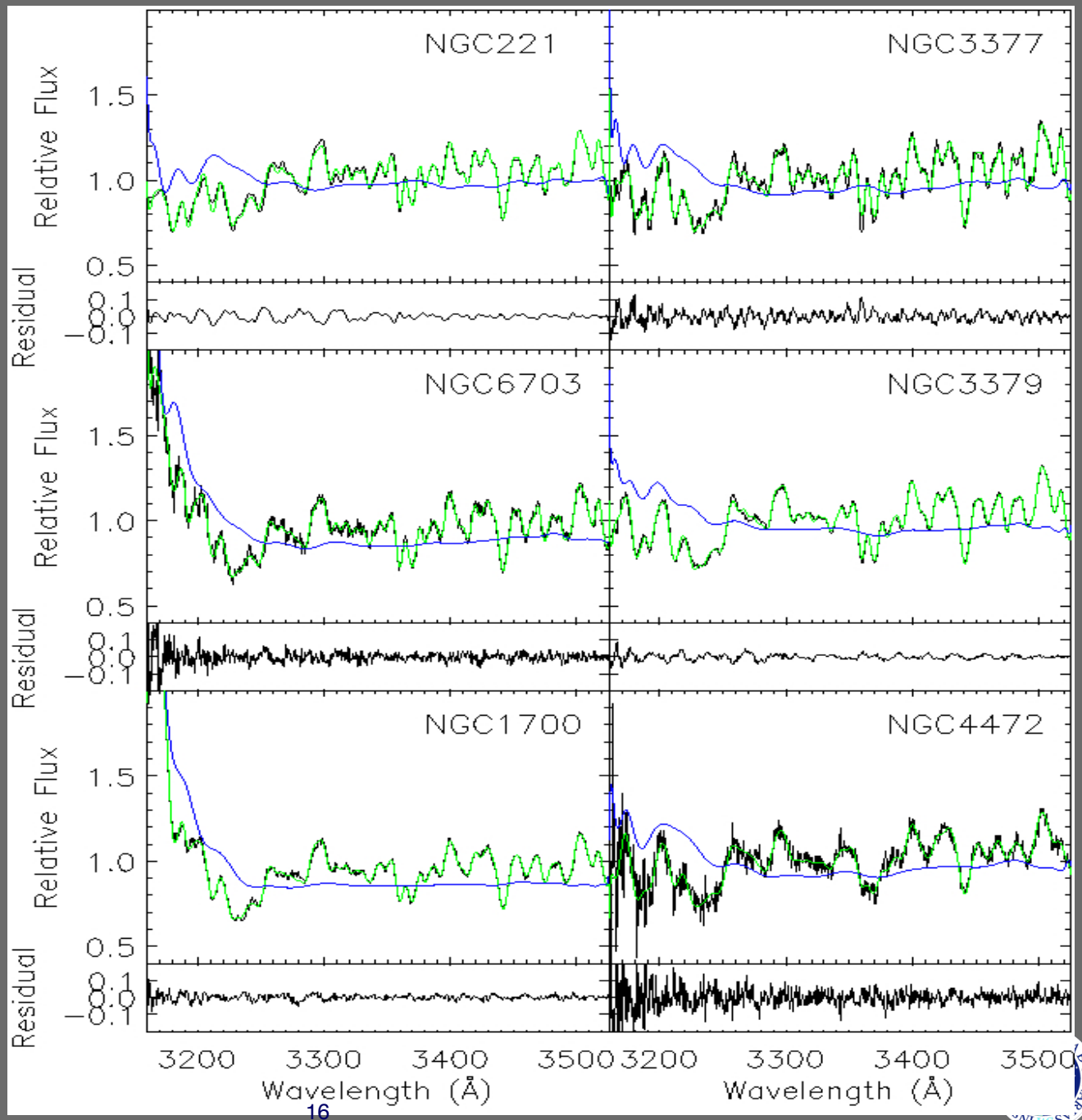
- Metal-rich globular cluster data well fitted (Ponder+98 data, Harris catalog metallicities) .
- Metal-rich clusters seem to be slightly younger than metal-poor ones.
- Massive galaxies (Ponder+98) show smaller Mg2800 index values as predicted by the models.



A. Vazdekis
Instituto de Astrofísica de Canarias

ETG galaxy spectra

Galaxy ages and metallicities in good agreement with the results obtained in the optical range performing full spectrum fitting (ULySS) (Toloba +09 data)



A. Vazdekis
Instituto de Astrofísica de Canarias

Conclusions

- Extended MILES models down to 1680Å for a range of metallicities ages and IMFs.
- NUV promising at disentangling SFHs: young stellar populations are much easily separated
- UV line-strengths behave differently in comparison with optical indices opening new diagnostic diagrams
- Colours & line-strengths of metal-rich globular cluster well matched in agreement with the results obtained from the optical range
- Massive ETGs seem to require a contribution of young stellar populations (1-5%).
- Work to be done to further constrain stellar cluster and galaxy spectra:
  - Extend the metallicity coverage for younger populations
  - Fine-tune abundance ratios (Mg/Fe, CN/Fe…)
  - Bluer HB prescriptions for metal-poor clusters
  - Work out optimized diagnostic line indices
  - Varying SFHs
  - …