Detailed chemical composition of the peculiar globular cluster NGC 1851:

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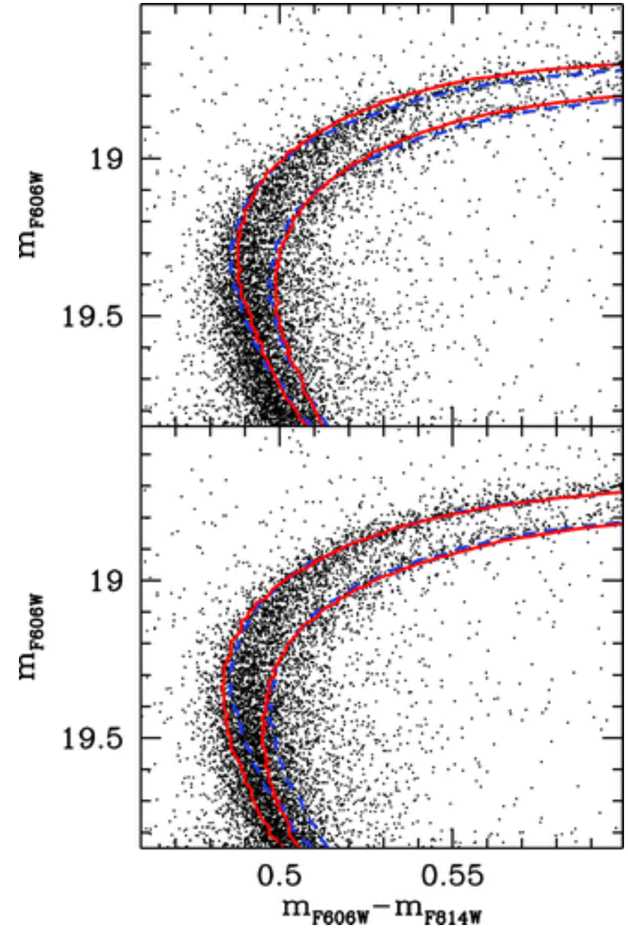
- It has been long suspected that NGC 1851 is not chemically homogeneous (e.g., Walker 1992).
- By now, it is clear that NGC 1851 has two distinct subgiant branches, however explanations for their origin so far lack consensus.

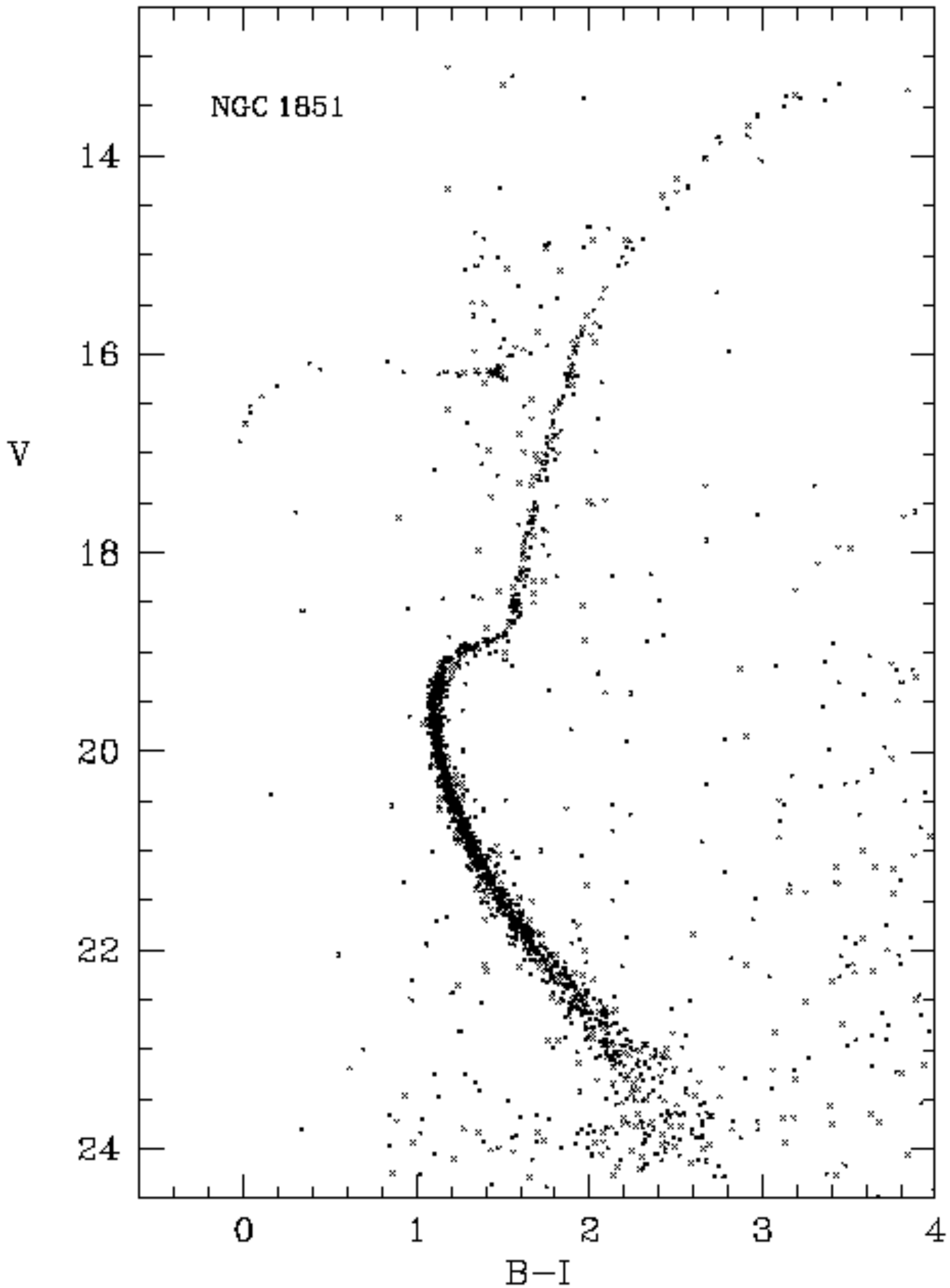


***Cassisi et al. 2008 - Top*: *m*F606W vs. diagram of NGC 1851 by M08 zoomed around the SGB. The solid lines represent the isochrones for the extreme population with and ages of 9 and 10 Gyr. The dashed lines are isochrones for the normal population and ages of 10 and 11 Gyr. The isochrones are shifted by and (see text for details). *Bottom*: As above, but this time the solid lines represent the extreme population with . The ages are again 9 and 10 Gyr.**

http://iopscience.iop.org/article/10.1086/527035/fulltext/fg2.html

Explanations of the two evolutionary sequences:

- Two generations of stars, the first being primordial, while the second one being born from the ejecta of a fraction of the stars of the first population (e.g., see the review by Gratton et al. 2012)
- NGC 1851 originated by merging of two globular clusters (e.g. Campbell et al. 2012)
- NGC 1851 is a naked nucleus of a captured and disrupted dwarf galaxy (e.g. Bekki & Yong 2012; Marino et al. 2014)
- NGC 1851 may have been formed by the merger between parental globulars that were once located within a dwarf spheroidal galaxy (van den Bergh 1996; Carretta et al. 2010)



Observations

ESO VLT telescope + UVES

Spectra of resolving power R ~ 47 000

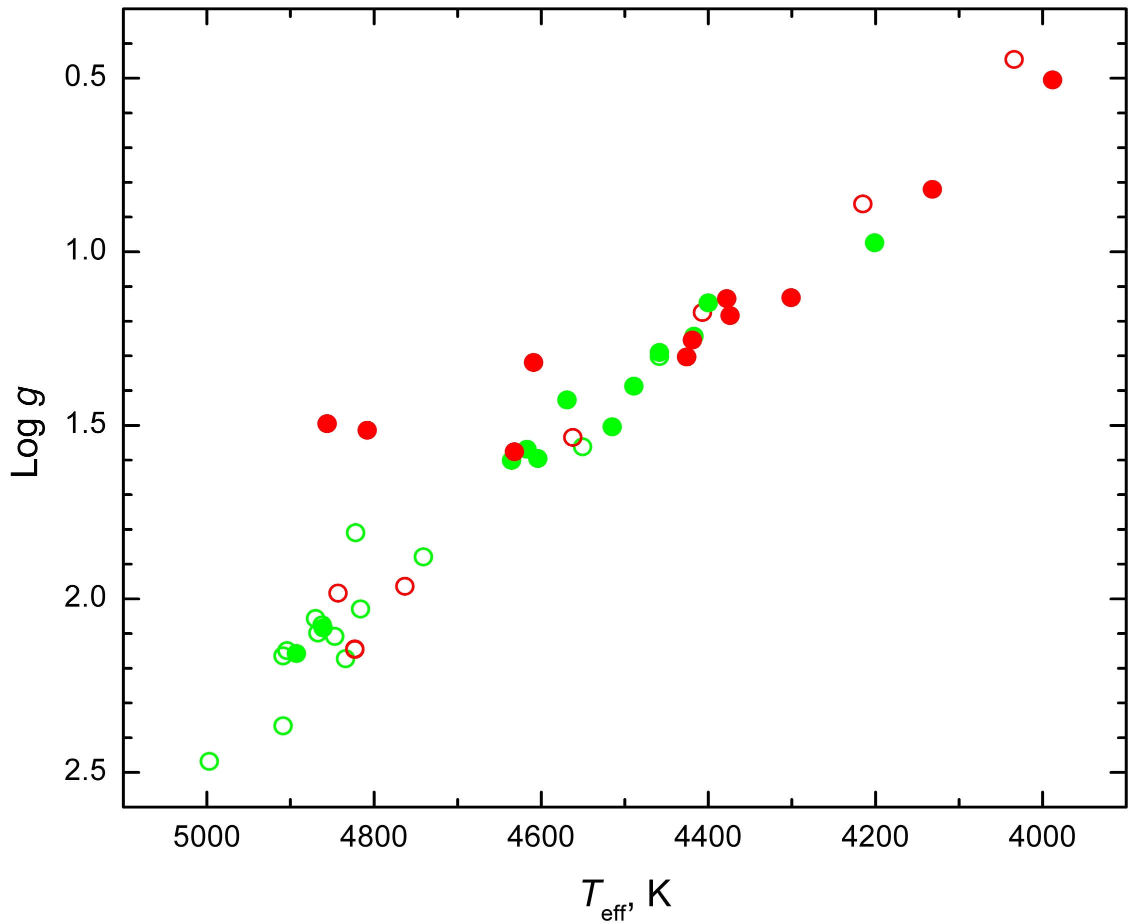
Wavelength interval of 4700–6840 Å with a gap of about 50 Å in the centre

Signal-to-noise ratios from 40 to 180, depending on the stellar brightness

A log g, T_{eff} diagram of the 47 investigated NGC 1851 stars.

The metal-rich population is marked by green, the metal-poor – by red symbols.

Stars with CNO abundances determined are shown by filled symbols.

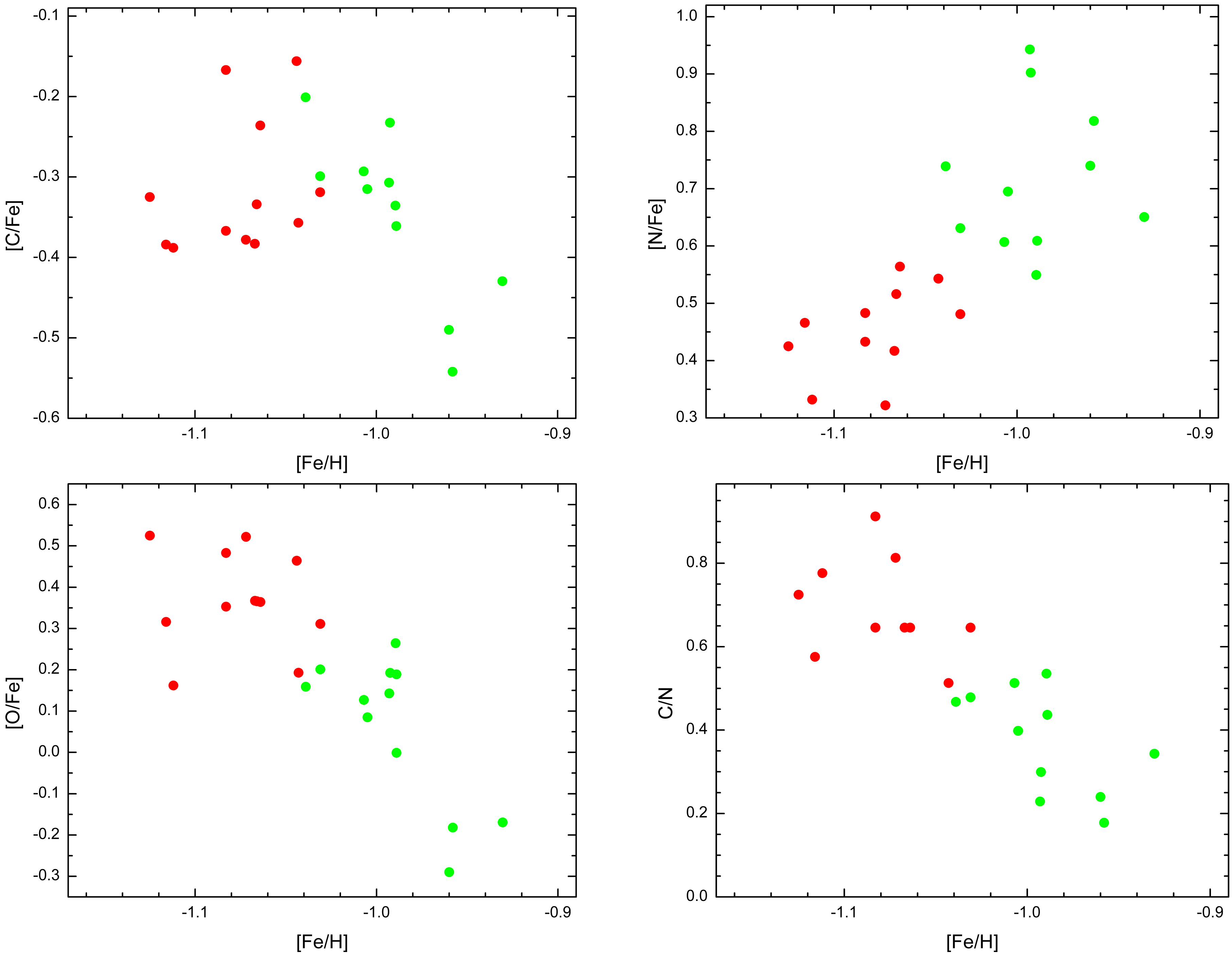


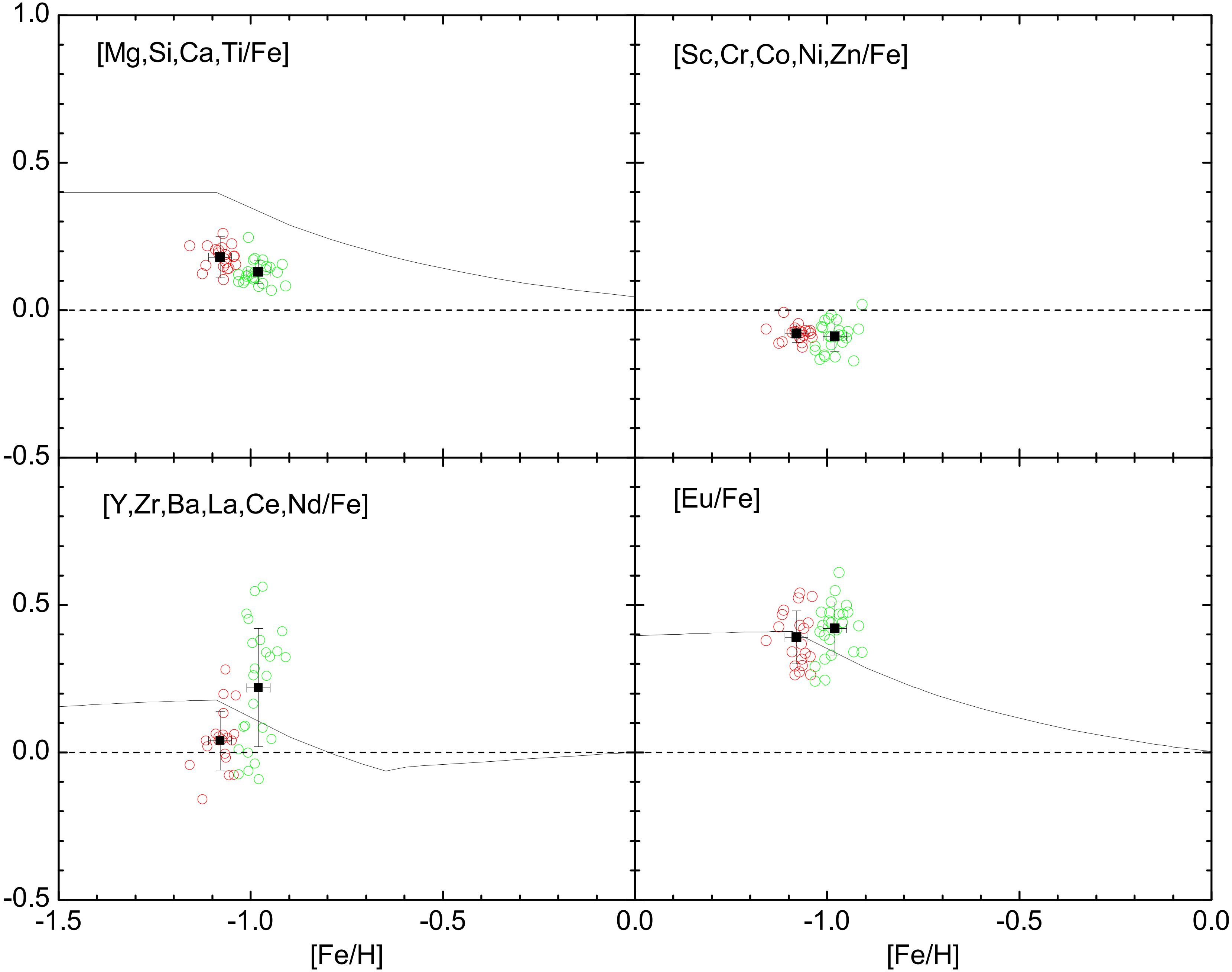
The mean [Fe/H] values:

–0.99±0.03 (28 stars)

–1.08±0.03 (19 stars)

Homogenized from 13 Gaia-ESO Survey WG11 Nodes


[C/Fe]
[Fe/H]
[N/Fe]
[Fe/H]
[O/Fe]
[Fe/H]
C/N
[Fe/H]



Galactic thin disc models from Pagel & Tautvaisiene (1995, 1997)

Results

- The detailed chemical composition was determined for a sample of 47 red giant branch stars.
- **The stars in our sample can be separated into two groups with the following characteristics:**
- a difference of 0.1 dex in the mean metallicity,
- a difference of 0.3 dex in the mean C/N,
- no significant difference in the mean values of C+N+O,
- chemical elements that are insensitive to internal stellar mixing show normal Galactic abundances of the corresponding metallicities.

Summary

This leads us to the hypothesis that NGC 1851 is the **Galactic globular cluster formed of two clusters** with slightly different turn-off masses as it was previously suggested by van den Bergh (1996), Carretta et al. (2010), Bekki & Yong (2012), Campbell et al. (2012), and references therein.