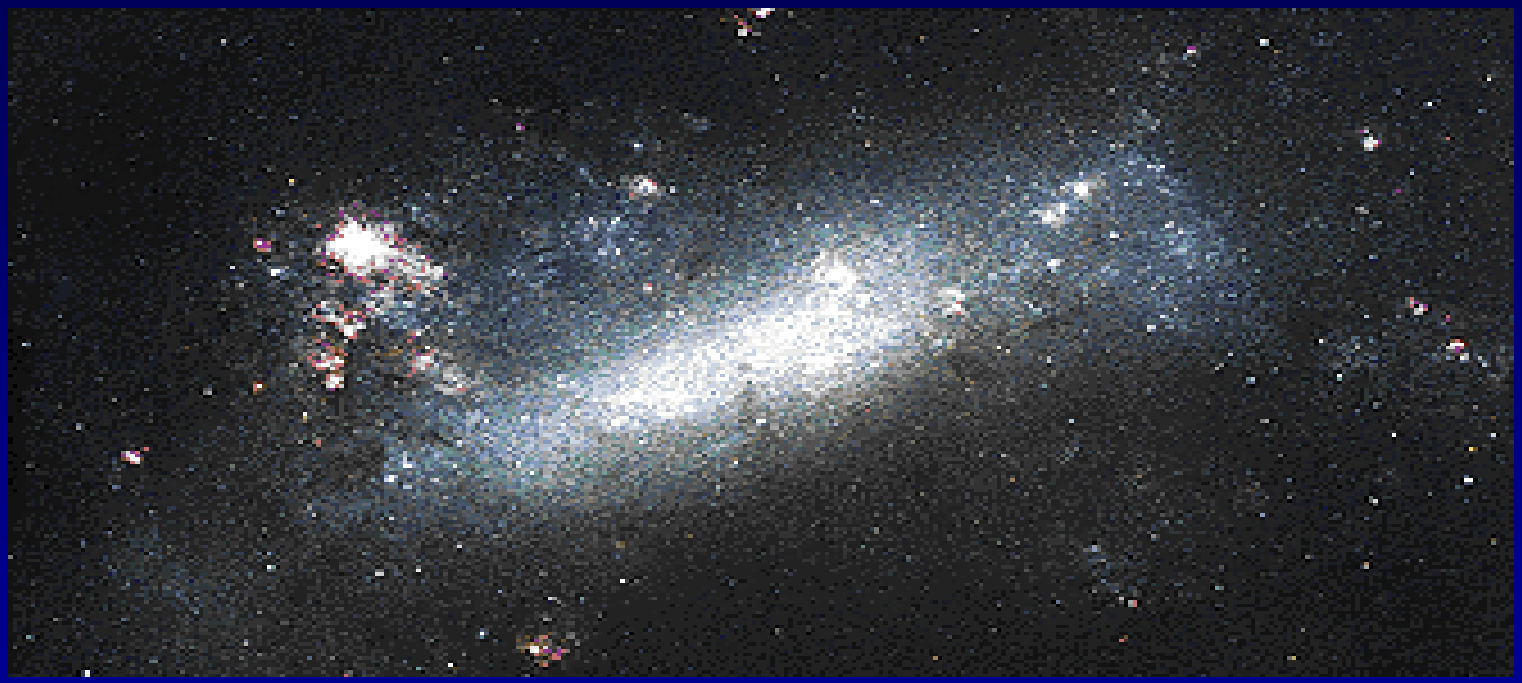
Abundances in a Large Sample of Stars in the LMC Disk



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Fellowship support: CAPES - FAPESP

- The main project
  - chemical distributions of significative samples (~100 stars) of stars in different regions of the LMC

  Present Work: Inner Disk (galactocentric radius 2kpc)

  Other fields:

  Bar

  Outer Disk (galactocentric radius 7kpc)

  Observational Facilities:

  GIRAFFE/FLAMES-VLT

  Colaborators: V. Hill, M. Spite, A. Cole, P. François, L. Pasquini, F. Primas, M. Romaniello, M.-R. Cioni, M. Tosi, D. Romano, T. Smecker-Hane, J. Gallagher

- **Project Steps**
  - **Sample selection:**

    available photometry; metallicity - Ca Triplet (Smecker-Hane et al. in press); astrometric data – accuracy better than ~ 0.3 arcsec (131 fibers with a 25 arcmin field, 11 arcsec separation of the objects)
  - **Wavelength range selection (wavelength range for exposition of ~250Å); atomic data (α-elements - SNe II, *s*-process elements - AGB and massive stars; iron-peak elements - SNe Ia); model atmospheres**

- **Observation: ~ 10 hr exposure, 1 hour integration**
- **Reduction:**

  - BLDRS (GIRAFFE Base-Line Data Reduction Software) → contamination by ThAr spectra

  - MIDAS
- **Inference of stellar parameters: from photometry; spectroscopic methods**
- **Determination of stellar abundances**

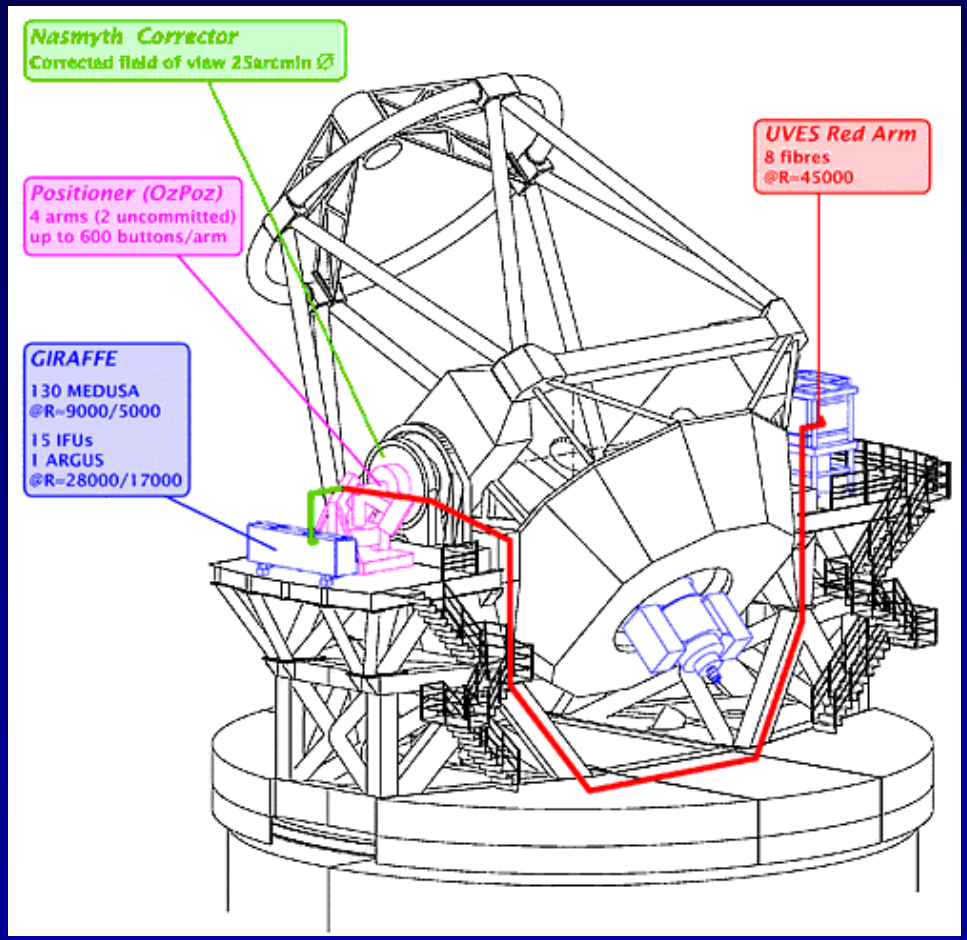
Observations

- VLT UT2 8m telescope at Paranal
- observations: Science Verification Period at 02/2003 and 03/2003, and at 02/2004
- 67 stellar spectra
- S/N ~ 40
- FLAMES/GIRAFFE spectrograph: MEDUSA configuration
- High resolution: R ≈ 22.000 – 28.800
- 3 setups:

  H14 λ638.0 - λ661.5 nm

  H13 λ612.0 - λ639.8 nm

  H11 λ559.7 - λ584.0 nm

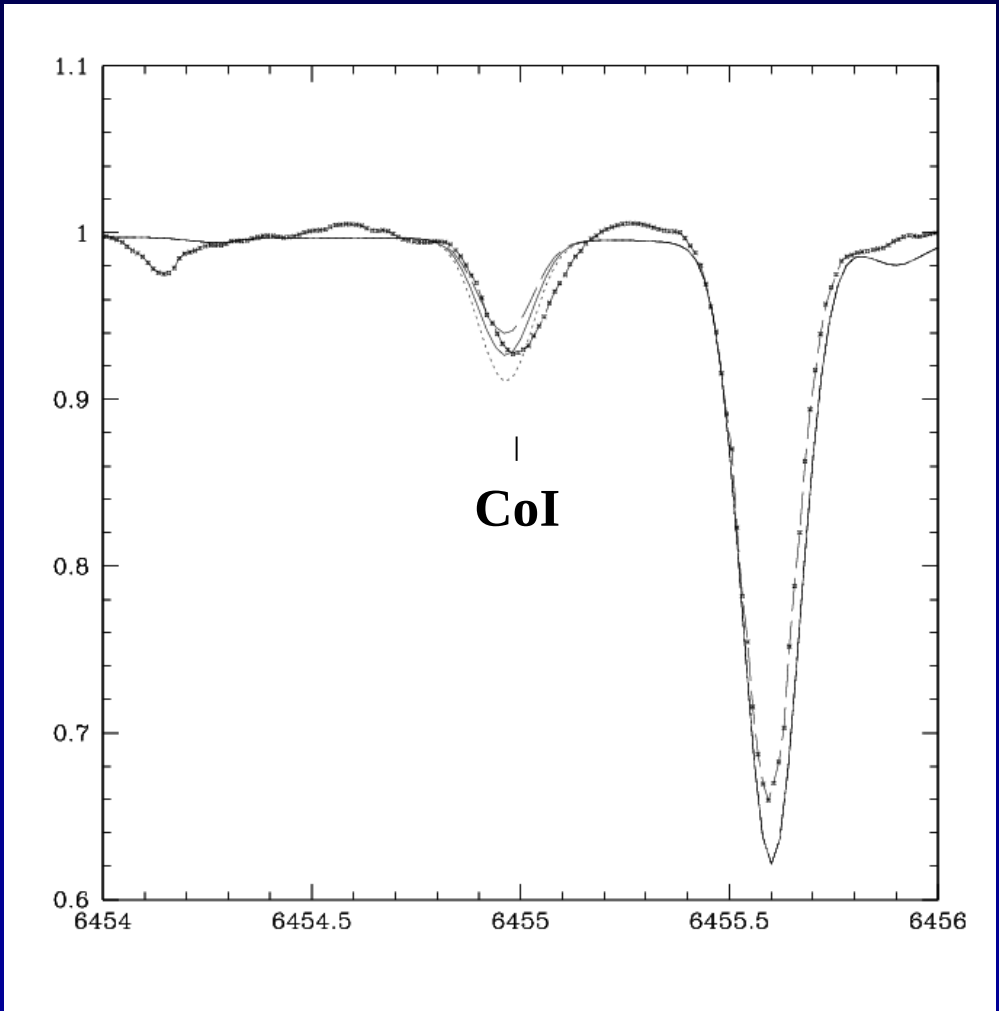


Abundance Determination

- Abundances derived from EW
  Fe, Ni, Cr, V, Si, Ca, Ti, Na, Y, Zr, Ca, Cr

- Abundances derived by line sythesis
  Oxygen: [O I] 6300Å
  Magnesium: Mg I 6318 Å
  Lanthanium: La II 6320 Å
  Cobalt: Co I 5647 Å
  Copper: Cu I 5782 Å

Line Synthesis

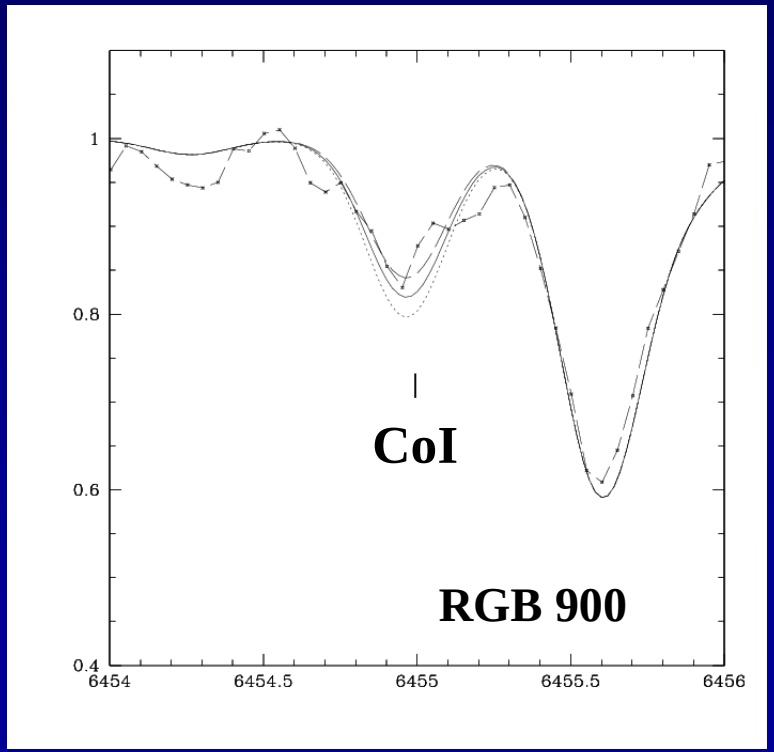


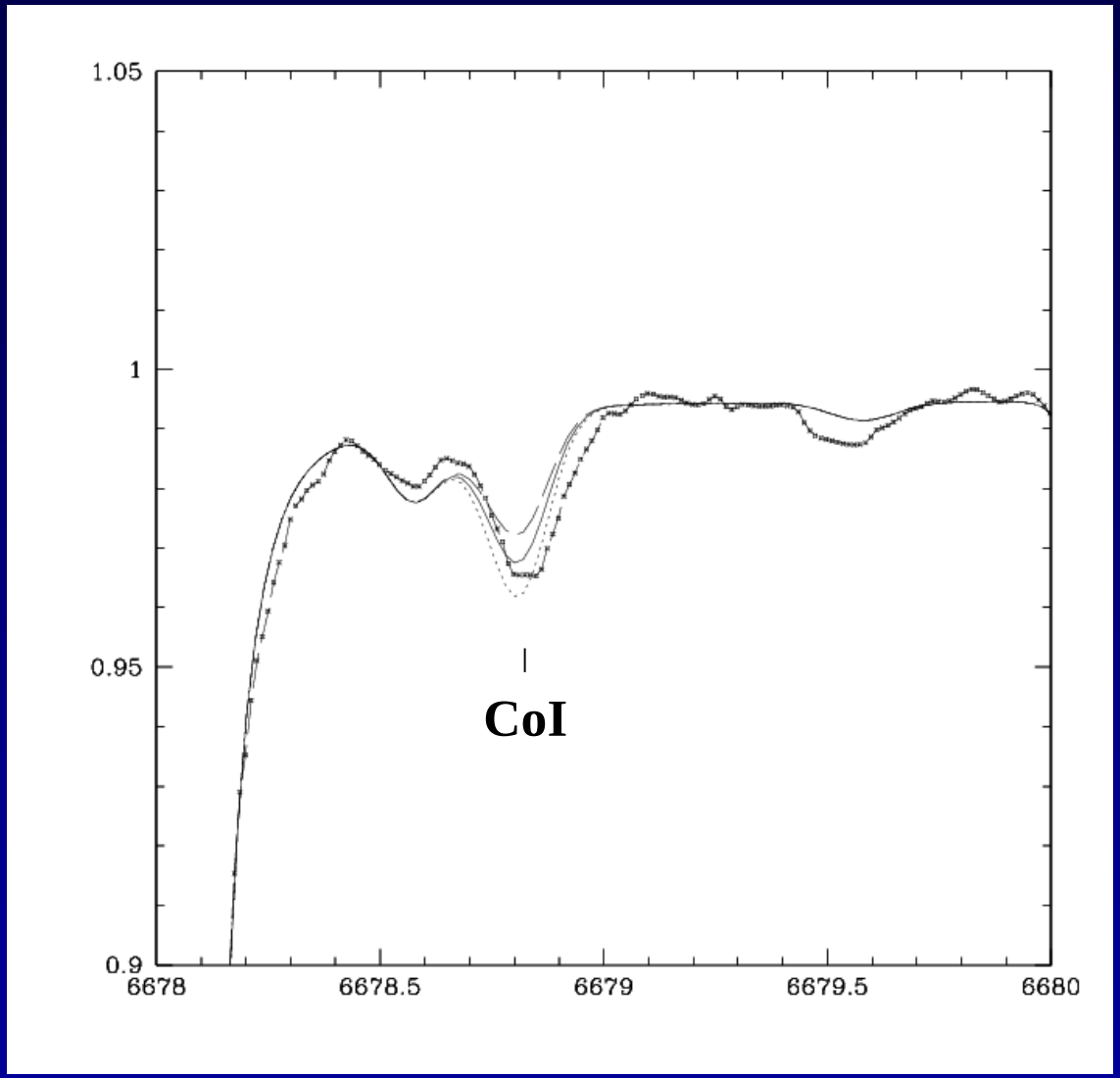
Cobalt:

test with different lines

Co I 6454Å

$[Co/Fe]_{Sun}$ = + 0.12 dex

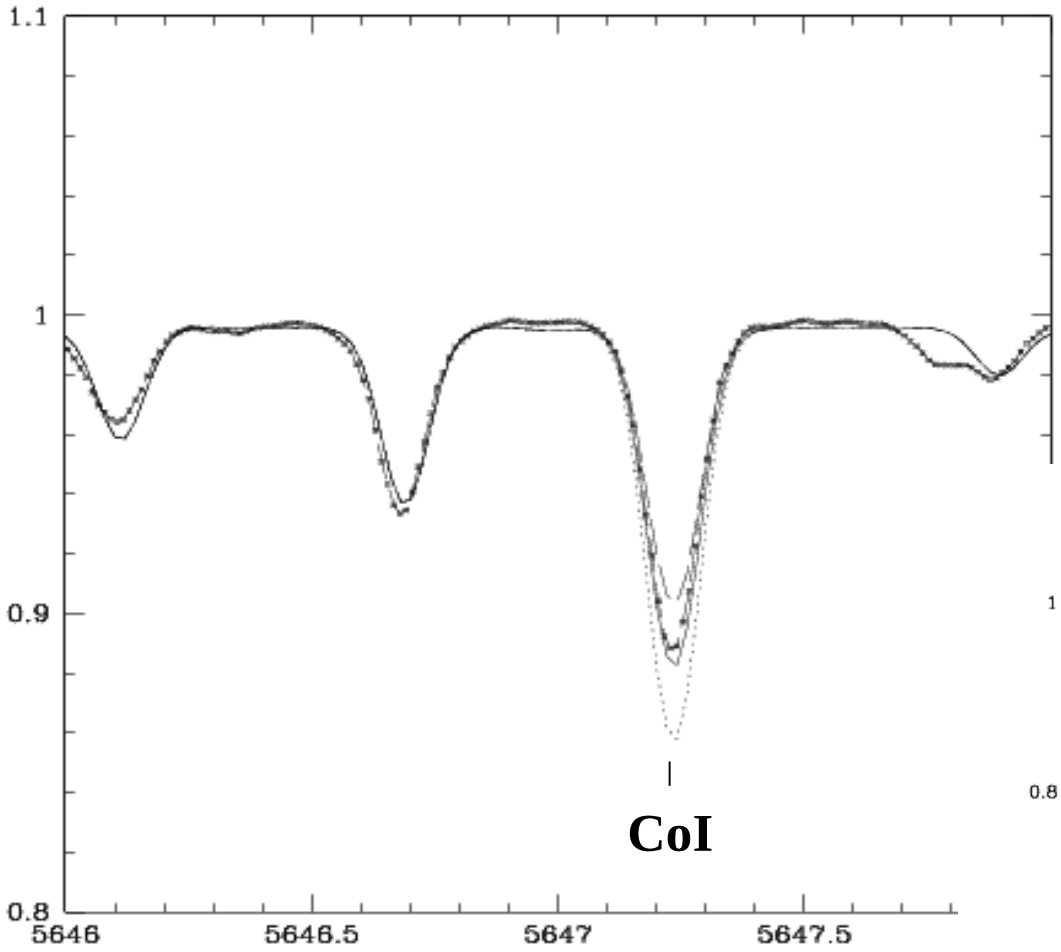




Co I 6678.85Å

$[Co/Fe]_{Sun}$ =

+ 0.13 dex

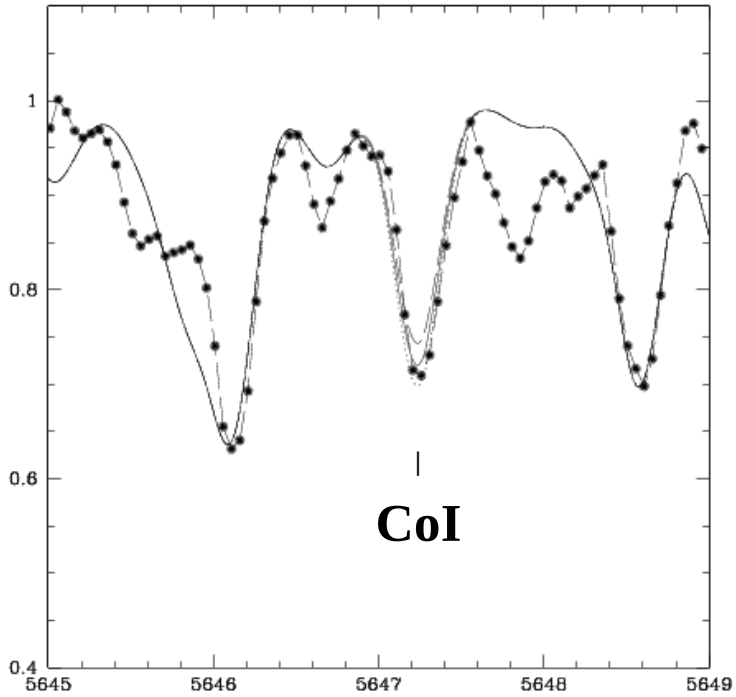


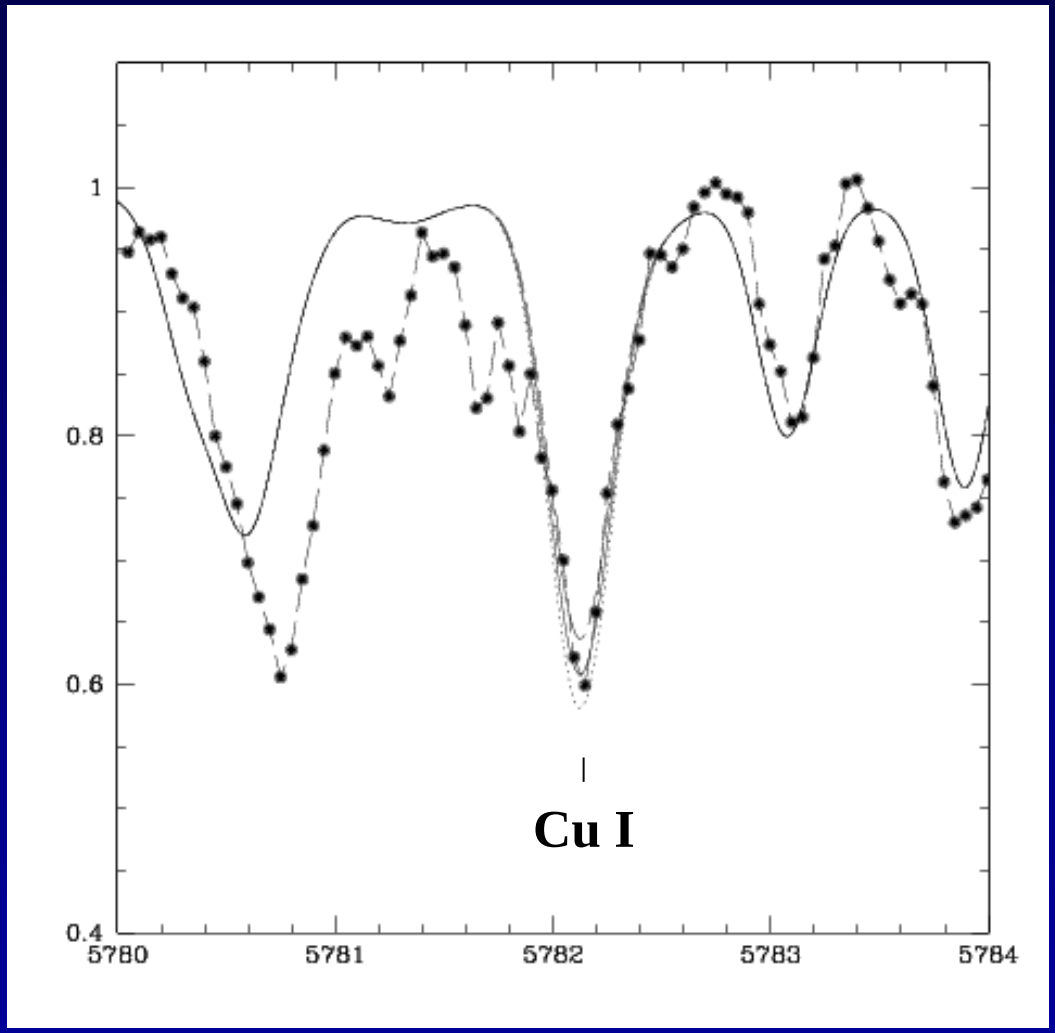
Co I 5647.23 Å:

$[Co/Fe]_{Sun}$ =

+0.01

RGB 789



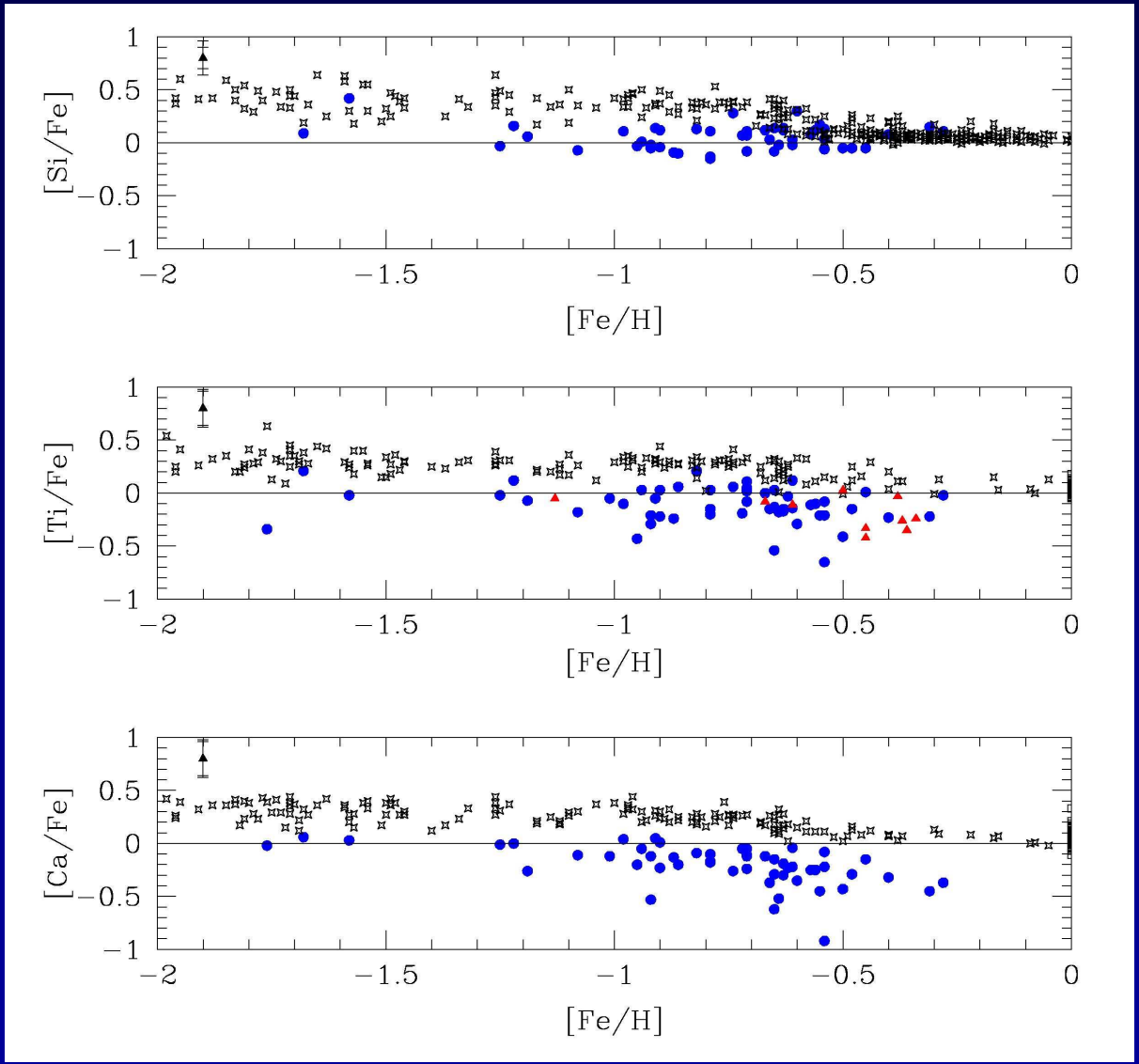


Copper

Cu I 5782.13 Å

RGB 789

Chemical Distributions

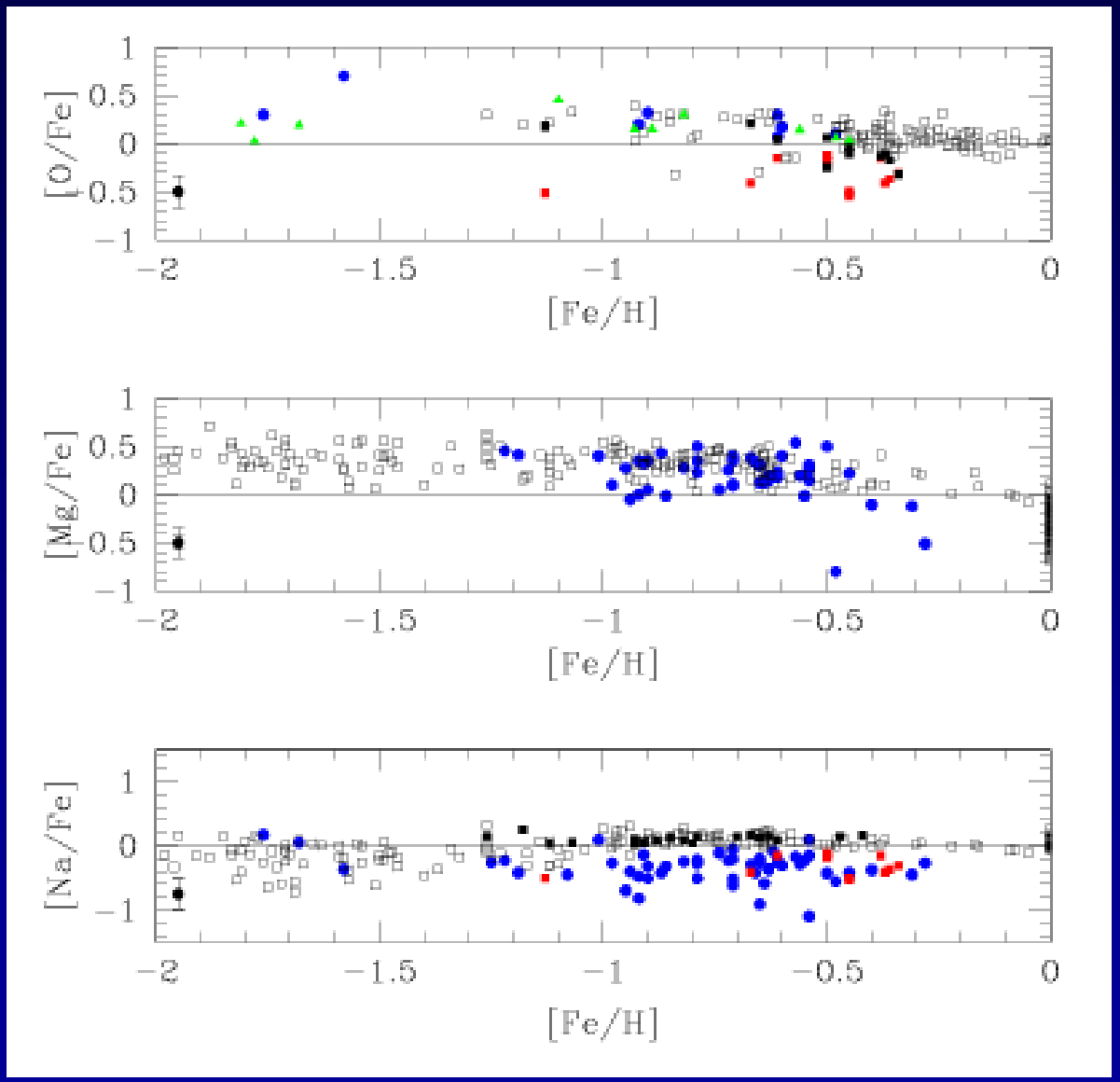


Si, Ti and Ca

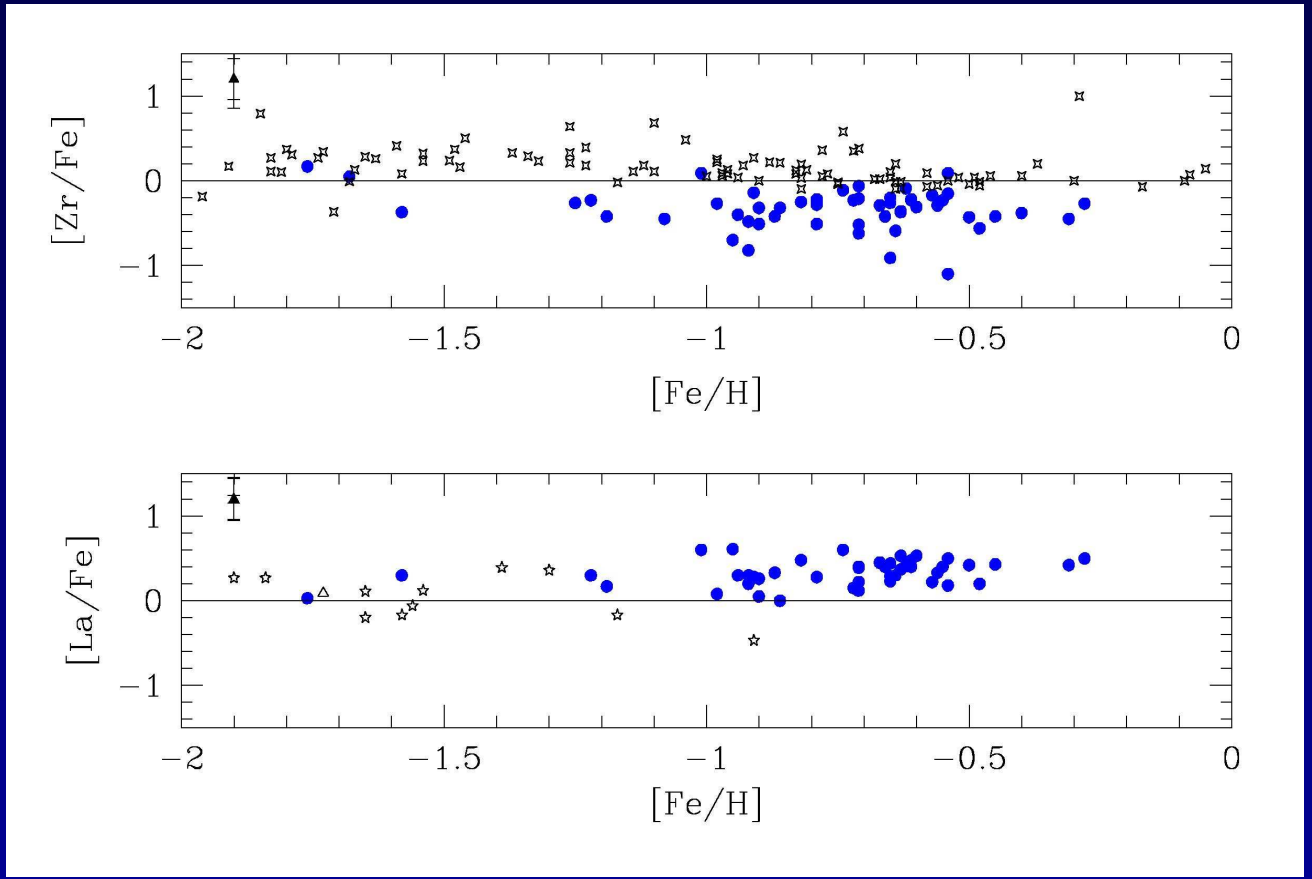
Blue dots - our sample; black symbols – MW disk samples of Fulbright (2000); Reddy et al. (2003); Prochaska et al. (2000), Burris et al. (2000); Johnson et al. 2002

LMC - ■ - Hill et al. (2000); ▲ - Smith et al. (2002); MW- [O/Fe] data from Bensby et al. (2004)

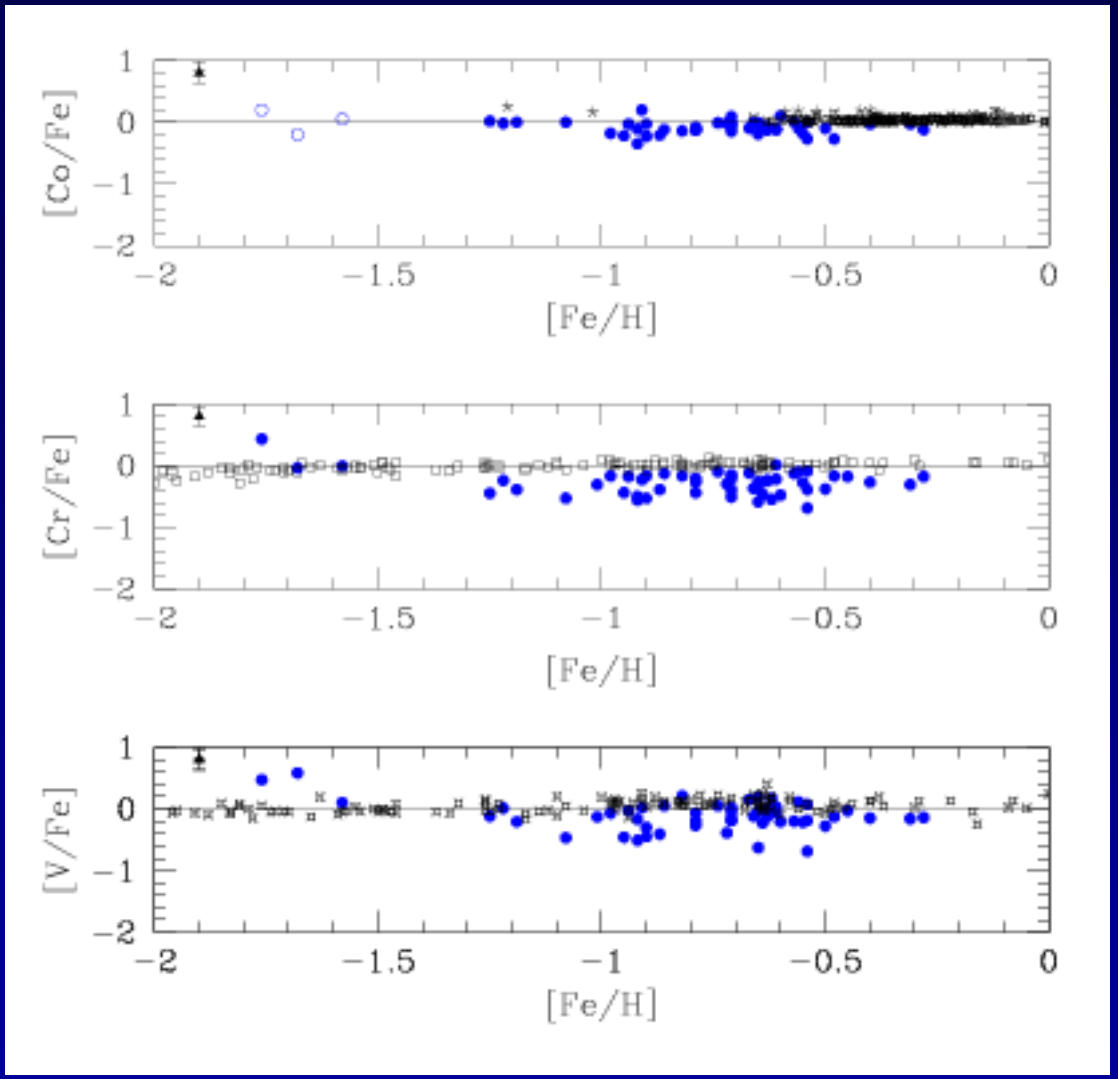
O, Mg and Na



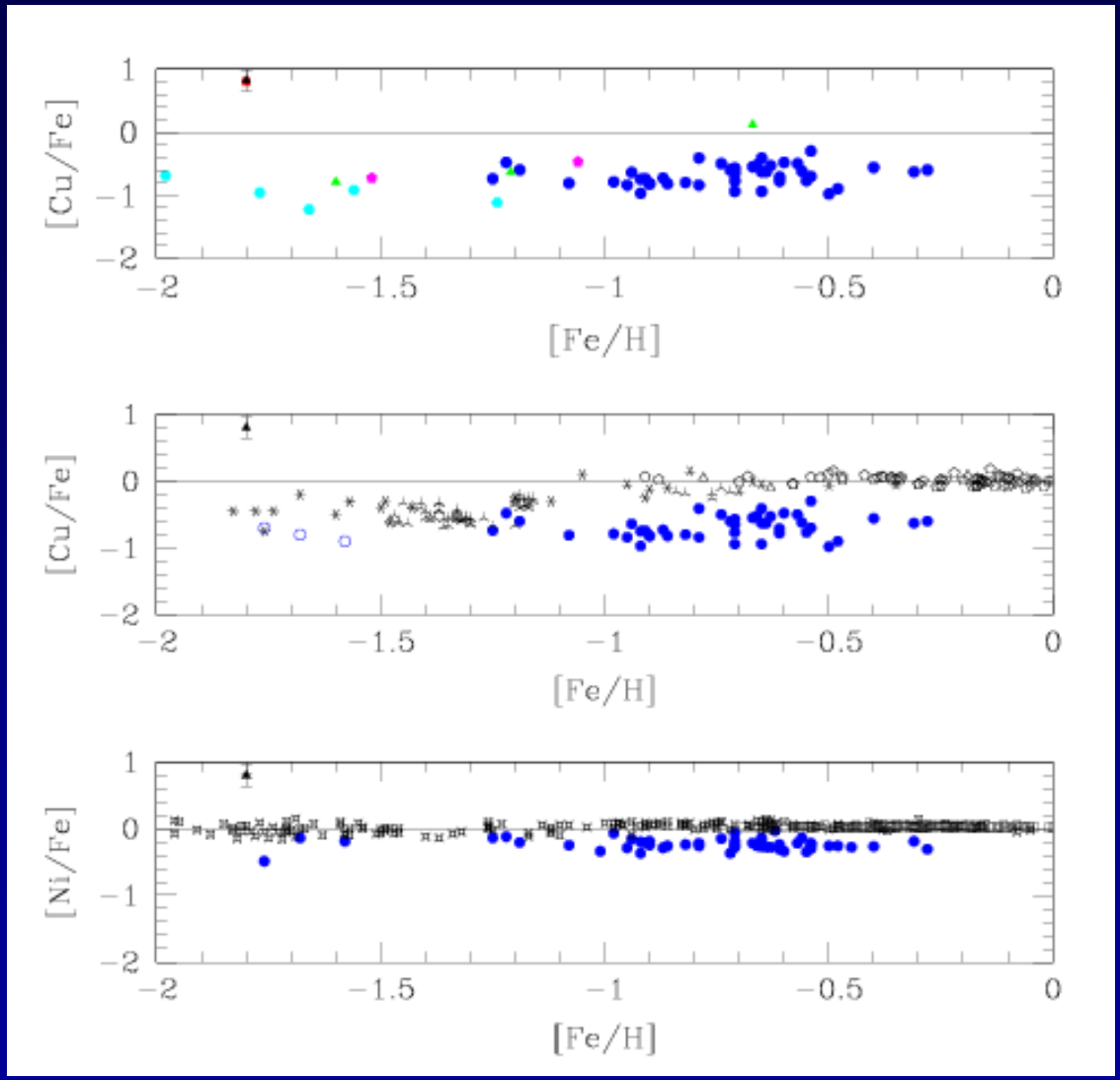
Heavy elements



Iron-peak elements



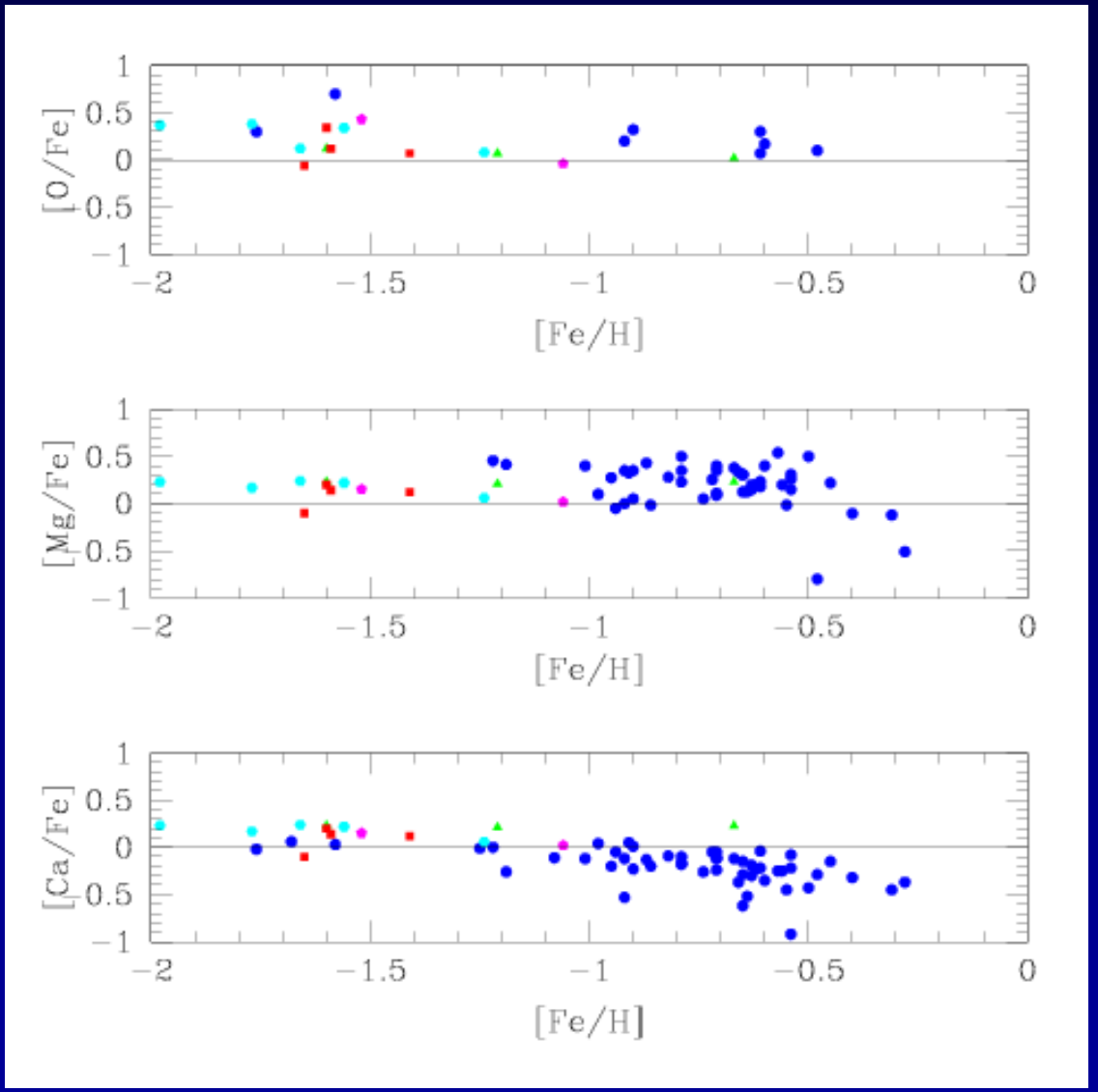
Cu and Ni



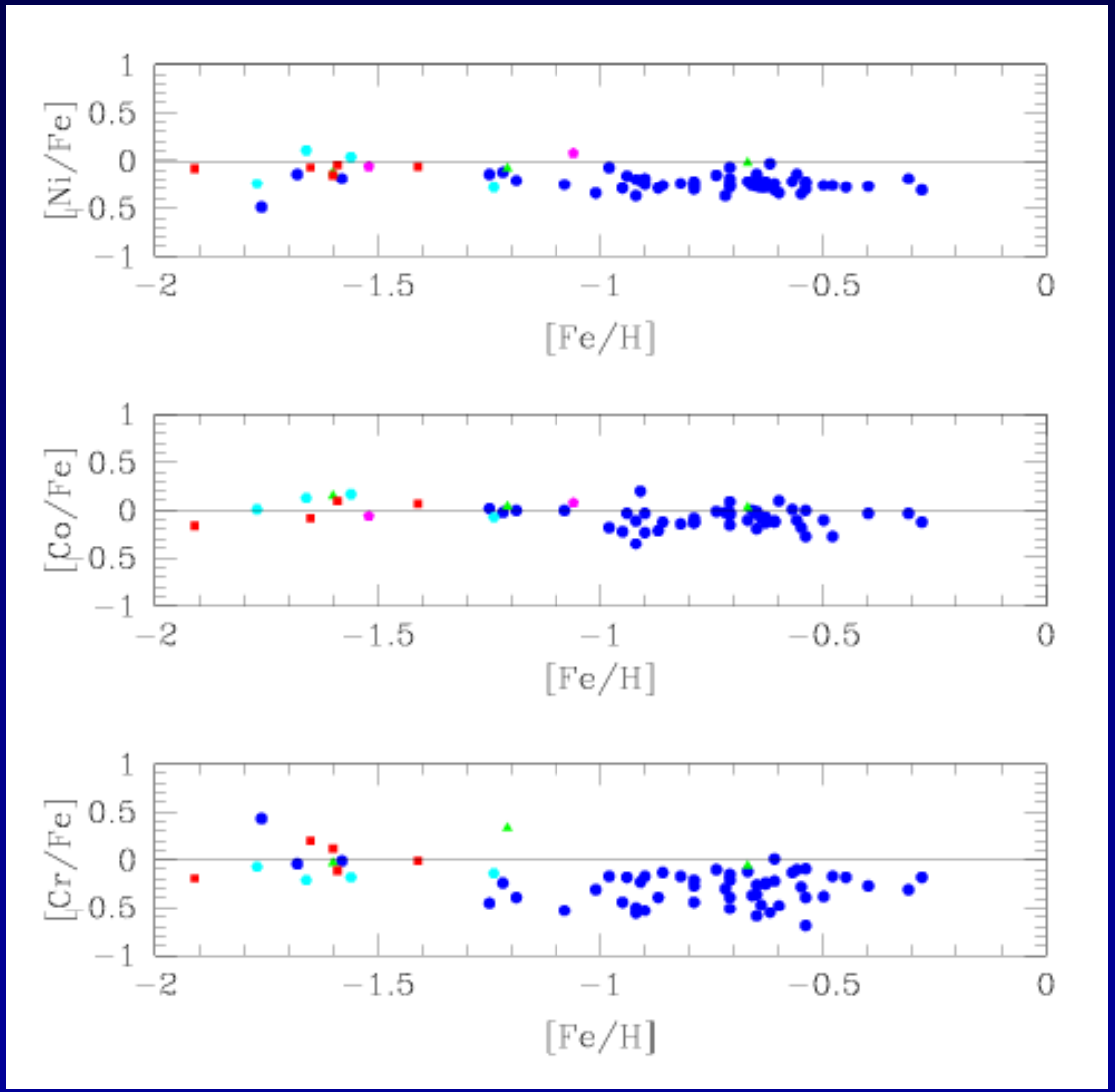
Dwarf Spheroidal Galaxies (Shetrone et al. 2003; Tolstoy et al. 2003)

- ▲ Fornax
- ⬟ Leo I
- ■ Carina
- ● Sculptor

Alpha-elements: LMC vs. dSph



Iron-peak: LMC vs. dSph



Conclusions

- **LMC shows a different chemical pattern when compared to the galactic distributions iron-peak elements show a new pattern with subsolar values, underabundant relative to galactic samples**
- **there is no evidence for a possible origin of the galactic halo from merging of small LMC systems**
- **compared to dSph galaxies distributions, there is an apparent superposition for stars with similar metallicities**