Structure and Evolution of the Milky Way

CoRoT : Stellar Masses (M) and Radii (R) for ~30000 red giants

$R + T_{eff}$ ➔ Luminosity (L)

m +BC ➔ ℓ

} Distance $d^2=L/\ell$

10-15% uncertainty

M ➔ ages 40% uncertainty

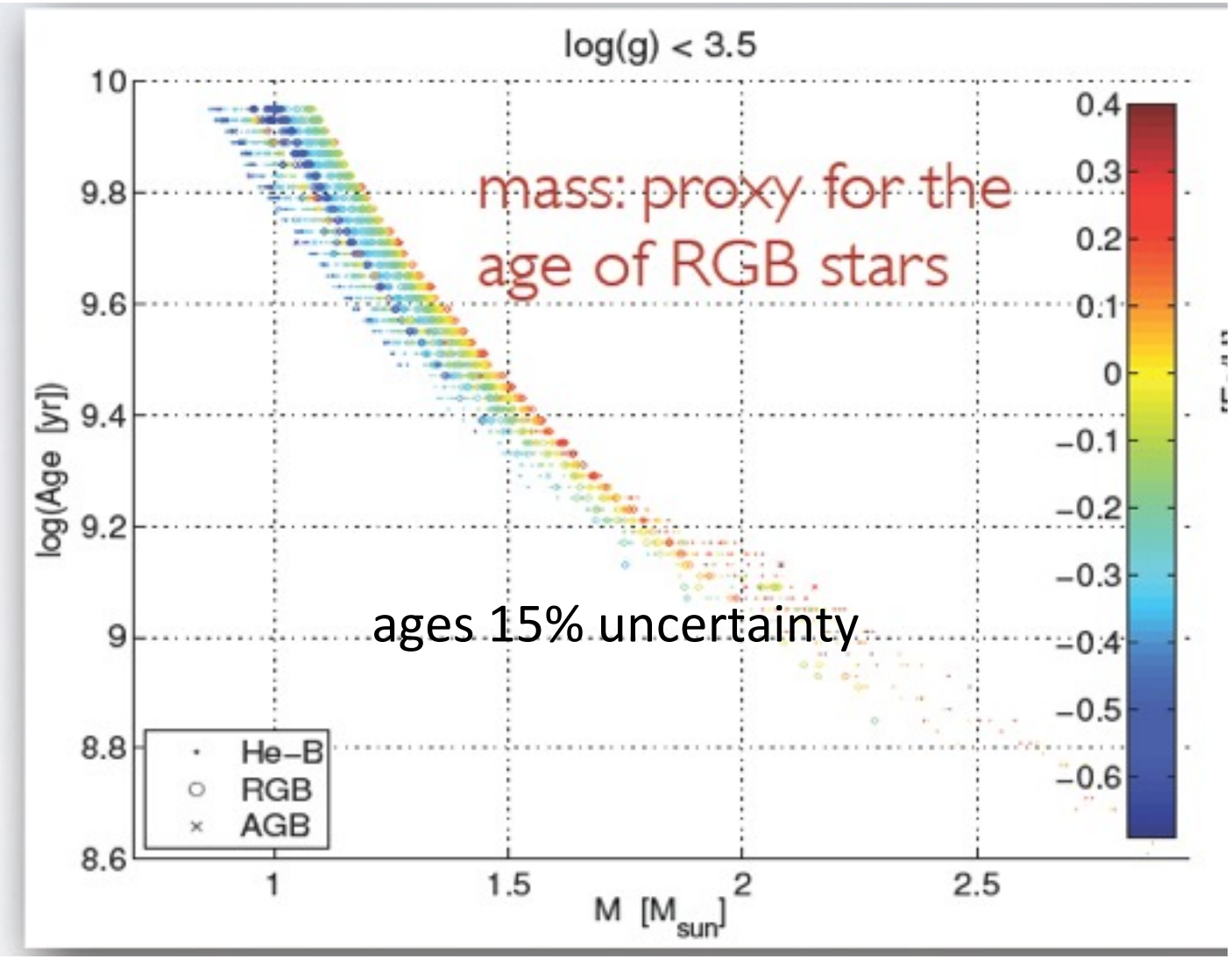
CoRoT will provide M, R, ages and distances for ~30000 Red Giants up to 10 Kpc from the Sun

BUT

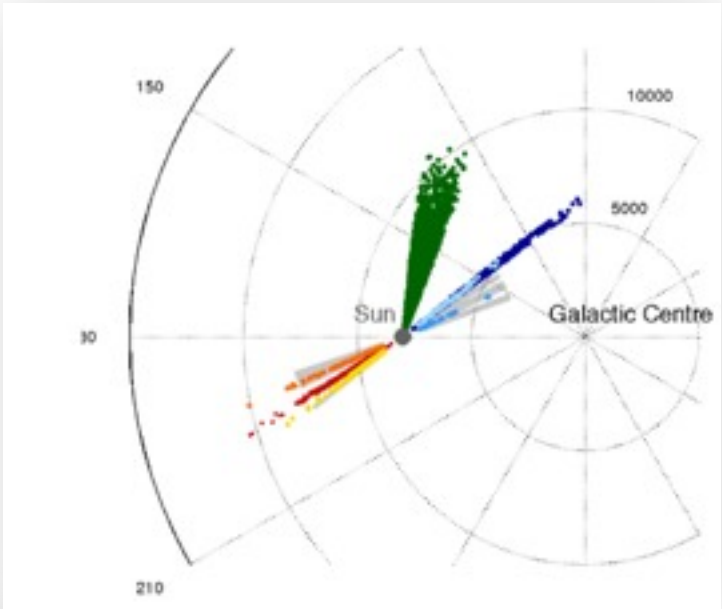
for a complete chemo-dynamical picture of the Galaxy,

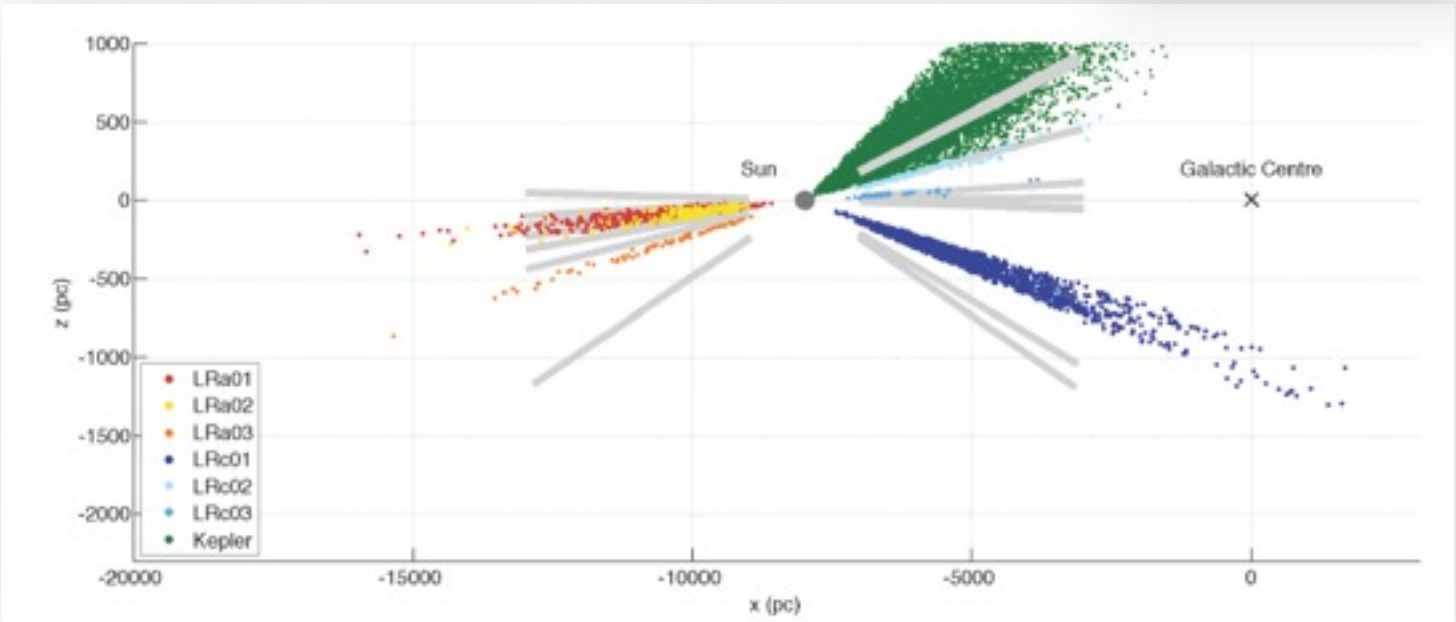
Spectroscopic constraints are needed: [Fe/H], [α/H] , v_{rad}

Structure and Evolution of the Milky Way



Galactic location of CoRoT & Kepler red giants

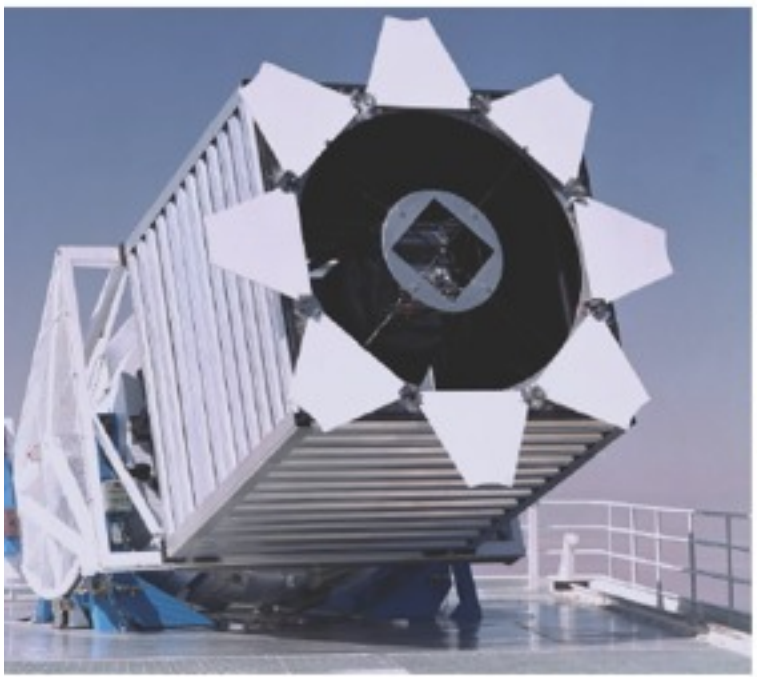




APOGEE

The ***Apache Point Observatory Galactic Evolution Experiment*** **(APOGEE)** will use high-resolution, high signal-to-noise infrared spectroscopy to penetrate the dust that obscures the inner Galaxy. APOGEE will survey **100,000 red giant stars** across the full range of the Galactic bulge, bar, disk, and halo. Precise radial velocities and detailed chemical abundance "fingerprinting" will provide unprecedented insights into the dynamical structure and chemical history of the Galaxy.

- H-band survey of Galactic populations (H < 12.5)
- 100,000 stars (80% red giants)
- R~22500, S/N=100
- Chemical abundances (0.1dex)
  15 elements – including :
  C, N, O, Na, Mg, Ca, Mn, Fe, Co, Ni
- Velocity error= 0.5 km/s
- Targeted from 2MASS



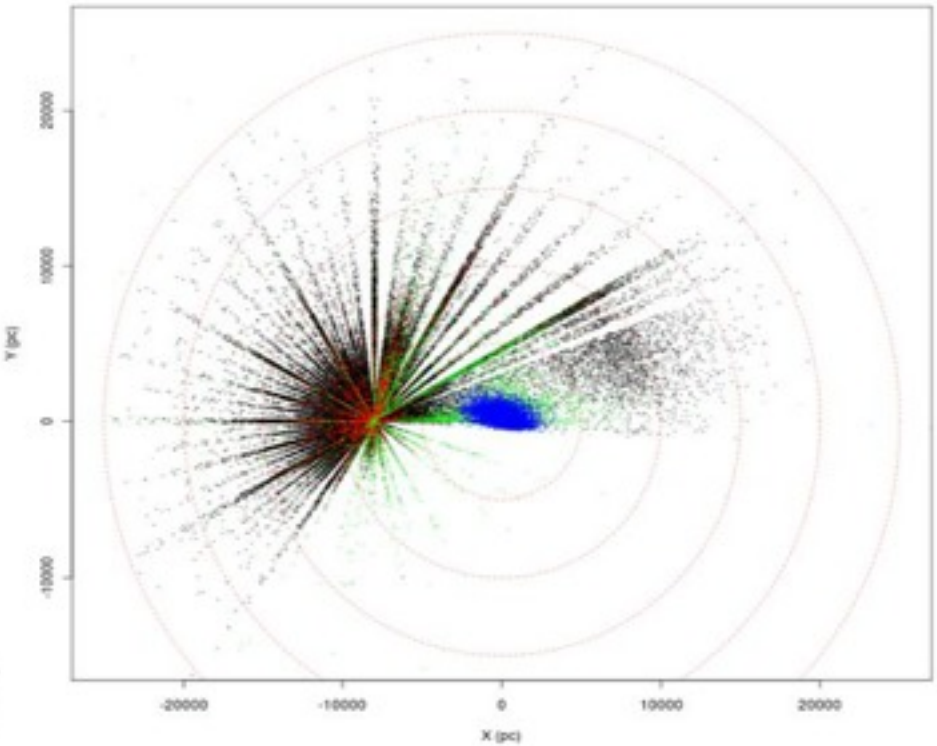
SDSS 2.5-meter telescope
at the Apache Point Observatory, NM
Image Credit: Sloan Digital Sky Survey

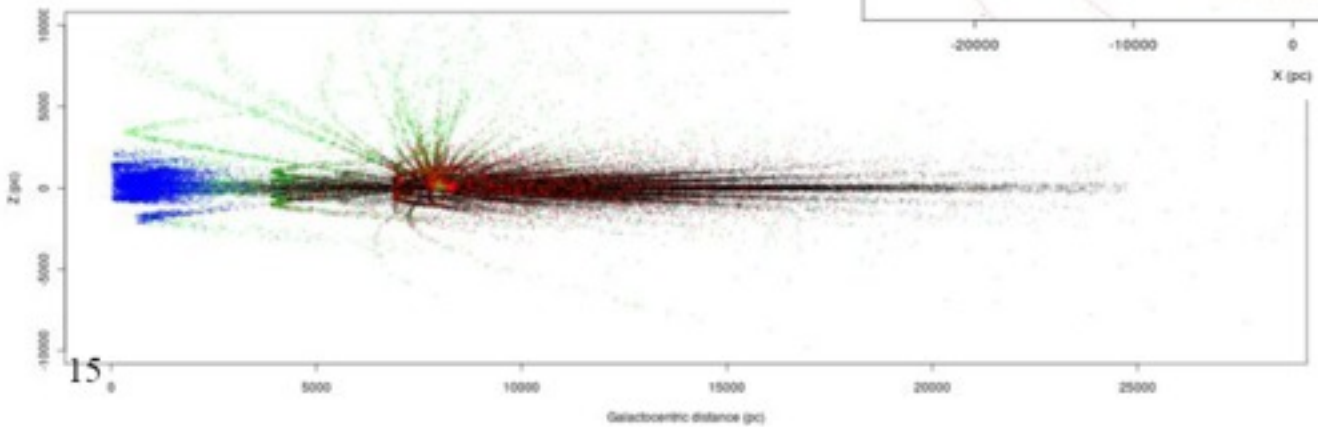
APOGEE

For currently selected fields

Bulge	*8000 stars*
Thin disk	*84100 stars*
Thick disk	*4300 stars*
Halo	*4500 stars*

79% giants



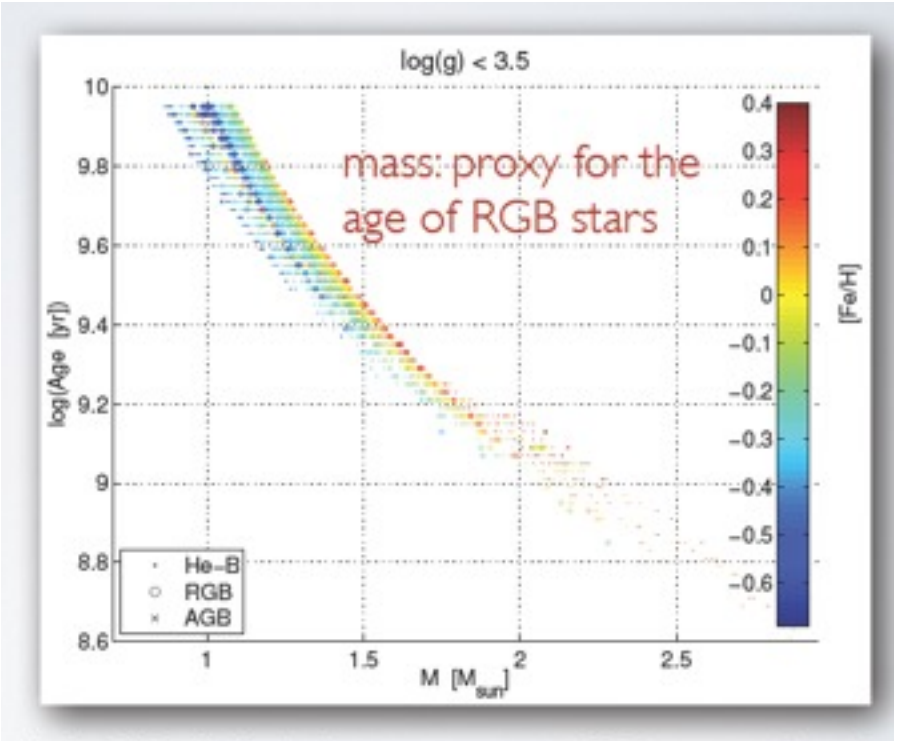


APOGEE-CoRoT

APOGEE will observe a fraction of the CoRoT- RGB

M & [Fe/H] : “Chronometer” for evolved stars

Ages better than 15% for red giant stars at different locations in the galactic disc (thin and thick disc) and in the galactic bulge



APOGEE + CoRoT & Kepler
Age-metallicity and Age-radial velocity relationships : Chemo-dynamical picture of the MW

Proposed CoRoT members for the collaboration ~ members of the CoRoT Red Giant Group

Annie BAGLIN -- quality validation of data
Caroline BARBAN* -- spectrum analysis, pipeline
Mauro BARBIERI -- stellar populations
Frederic BAUDIN -- spectrum analysis, pipeline work, stellar parameters
Kevin BELKACEM -- spectrum modeling, seismic signatures of rotation
Guy DAVIES -- spectrum analysis, pipeline work, stellar parameters,granulation, and rotation
Joris DE RIDDER* -- spectrum analysis, stellar parameters
Marc-Antoine DUPRET -- Stellar models, non-adiabatic oscillations and theoretical power spectra, rotation-oscillation coupling
Patrick EGGENBERGER -- stellar evolution models, stellar physics.
Rafael GARCIA* -- spectrum analysis, pipeline work, stellar parameters, granulation and rotation
Marie-Jo GOUPIL -- spectrum modeling, seismic signatures of rotation
Mathieu GROSJEAN -- Non-adiabatic oscillations and theoretical power spectra
Saskia HEKKER -- spectrum analysis, pipeline work, stellar parameters, granulation, rotation, stellar physics and populations
Thomas KALLINGER* -- spectrum analysis, pipeline, grid modeling, granulation
Yveline LEBRETON -- stellar evolution models, stellar parameters, stellar physics
Carla MACERONI -- binary modelling - stellar parameters - ground-based observations
Savita Mathur* -- spectrum analysis, pipeline work, stellar parameters, granulation and rotation
Eric MICHEL -- spectrum analysis, stellar parameters
Andrea MIGLIO* -- grid-based and detailed modeling, stellar parameters, stellar populations
Josefina MONTALBAN* -- stellar evolution modeling, theoretical stellar oscillations, stellar parameters, stellar physics and populations
Benoit MOSSER* -- spectrum analysis, pipeline work, stellar parameters, granulation, rotation
Thierry MOREL -- Analysis of ground-based observations (determination of stellar parameters and abundances)
Arlette NOELS -- stellar oscillations, Stellar structure and evolution, stellar physics, stellar populations
Ritha-Maria OUAZZANI -- stellar rotation, rotational effects on pulsations
Rafael PERALTA -- spectrum analysis, stellar models, grid modelling, stellar parameters, stellar populations and pipeline.
Ennio PORETTI -- ground-based observations
Reza SAMADI -- stellar physics, stellar seismology, stellar structure models, turbulent convection, granulation
Marica VALENTINI -- spectrum analysis, stellar populations, stellar parameters
Paolo VENTURA -- stellar evolution modeling
Mathieu VRARD -- spectrum analysis, pipeline work, stellar parameters, granulation and rotation
Werner WEISS -- quality validation of data

***** *Members of the APOKASC team as well*

CoRoT builders:

Michel AUVERGNE
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Eric MICHEL
Werner WEISS
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Laurent JORDA
Frederic BAUDIN
Reza SAMADI
Annie BAGLIN