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Large Area Optical Specroscopic Surveys: Science with 4MOST



- Spectroscopic high latitude survey of the MW
 - 9 < I < 13
- GAIA spectral range and resolution
 - Ca triplet region (8400-8800Å), R_{eff}=7500
- 6dF at the 1.2m UKST in Australia
 - 100-120 fibres
 - 38 sqdeg FoV
- Scheduled operation: 4/2003 1/2013
 - 7 nights per lunation up to 8/2005
 - 25 nights per lunation since 8/2005
- 568000 spectra (Nov 2012)







Radial Velocities: DR4 Internal errors







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RAVE DR4 stellar parameters

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13 Nov







λ range: 8410-8795Å (Gaia wavelength range) Resolution R=7500 at 8600Å; Dispersion = 0.4Å/pix



From the RAVE spectra we obtain:

- radial velocities
- stellar parameters (effective temperature, gravity and metallicity)
- chemical abundances





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Going 6D: Distances of RAVE stars



- Fit Y²-isochrones to RAVE data/ deduced stellar parameters + J-K colors
 - J-Magnitude
 - Error in J-Magnitude
- Check by Monte-Carlo sampling
- **Result:**
 - 1/7 better 25%
 - 1/3 better 37.5%
 - 2/3 better 50%

Breddels et al, 2009 Zwitter et al, 2010 Burnett et al, 2010









Figure 1. Histograms of the difference between the Hipparcos parallaxes and the expectation of the parallax from the spectrophotometry.



Figure 2. Histograms of the difference between the Hipparcos parallaxes and expectation of the parallax from the spectrophotometry when the extinction is assumed to be zero.
Binney et al., 2012



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Kinematics vs Chemistry of thindisk, thick disk and halo





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Radial velocity gradient in the extended SN (Siebert et al 2011)







- RAVE: target of opportunity
 - We got the time before we had a detailed managements/ analysis plan
- Complexity of spectral data
 - Peculiarities: reliable detection
 - Degeneracies
 - Auxiliary data is essential
- Calibration, Calibration, Calibration
 - What are you calibrating against with 4MOST?
 - N_{spectra} can make up for resolution



- RAVE survey: more than 500,000 spectra taken
 - Radial velocities (1km/s)
 - Stellar parameters
 - Distances
 - Abundances
- Kinematical Tomography of the galactic disks
- Chemical Tomography of the galactic disks
- Detection of large-scale non-axisymmetry of the velocity field in the solar neighborhood
 - Apparent asymmetry above vs below the plane

