around for decades, yet it never really caught on with the observers. Only recently, with the latest diffusion models making such a uniform lowering plausible and the WMAP results constraining the primordial lithium abundance, has the idea gained credence. Atomic diffusion may thus resolve the cosmological lithium discrepancy (Korn et al. 2006), but we caution that other effects (the absolute temperature scale of Population II stars and the related issue of a trend of lithium with metallicity, the chemical evolution of lithium in the early Galaxy, see Asplund et al. 2006 for a recent review) may also play a significant role.

This work highlights three methodological points: the possibilities of the new generation of multi-object spectrometers at the largest telescopes, the virtue of a homogeneous and consistent analysis of all relevant criteria (spectroscopic as well as photometric) and the benefits of developing physical models to a higher degree of self-consistency. The empirical result that atomic diffusion affects atmospheric chemical abundances of old unevolved stars and that models can account for its effects is significant and has a number of consequences, some of which were discussed above. For the time being, turbulent mixing is introduced in an ad-hoc manner, without specifying the physics behind it. Likewise, we neglect the spectral effects of the thermal inhomogeneities and the 3D nature of convection in our traditional 1D analysis. Thus, a lot remains to be done before the quality of current observational data is adequately matched by physical models of stars, so that we can fully read the fingerprints of chemical elements in stellar spectra.

References

Asplund M. et al. 2006, ApJ 644, 229
Gratton R. G. et al. 2001, A&A 369, 87
Korn A. J. 2002, in: Scientific Drivers for ESO Future VLT/VLTI Instrumentation, ed. by Bergeron J. and Monnet G. (Springer, Heidelberg), 199
Korn A. J. et al. 2006, Nature 442, 657
Michaud G., Fontaine G. and Beaudet G. 1984, ApJ 282, 206
Piskunov N. E. and Valenti J. A. 2002, A&A 385, 1095
Richard O., Michaud G. and Richer J. 2005, ApJ 619, 538
Ryan S. G., Norris J. E. and Beers T. C. 1999, ApJ 523, 654
Schatzmann E. 1969, A&A 3, 331
Spergel D. N. et al. 2006, ApJ, in press
Spite M. and Spite F. 1982, Nature 297, 483
Thévenin F. et al. 2001, A&A 373, 905

VLT Image of Globular Cluster 47 Tuc

47 Tucanae is an impressive globular cluster that is visible with the unaided eye from the southern hemisphere. It appears as big on the sky as the full moon.

The colour image of 47 Tucanae presented here was taken with FORS1 on ESO's Very Large Telescope in 2001. The image covers only the densest, very central part of the cluster. The red giants, stars that have used up all the hydrogen in their core and have increased in size, are especially easy to pick out.

47 Tuc is so dense that stars are less than a tenth of a light year apart, which is about the size of the Solar System. By comparison, the closest star to our Sun, Proxima Centauri, is four light years away. This high density can cause interactions; these dynamic processes are the origin of many exotic objects, to be found in the cluster.

Thus, 47 Tuc contains at least twenty millisecond pulsars (neutron stars). The Hubble Space Telescope recently also looked at 47 Tuc to study planets orbiting very close to their parent stars. These observations showed that such 'hot Jupiters' must be much less common in 47 Tucanae than around stars in the Sun's neighbourhood. This may tell us either that the dense cluster environment is unhealthy for even such close planets, or that planet formation is a different matter today than it was very early in our Galaxy's history.

(Based on ESO Press Photo 20/06)

ESO PR Photo 20/06 is based on data obtained with FORS1 on Kueyen, UT2 of the Very Large Telescope. The image, seven arcmin wide, covers the central core of the 30 arcmin large globular cluster. The observations were taken in three different filters: *U*, *R*, and a narrow-band filter centred around 485 nm, for a total exposure time of less than five minutes. The data were extracted from the ESO Science Archive and processed by Rubina Kotak (ESO) and the final image processing was done by Henri Boffin (ESO). North is up and East is to the left.