

The ESO-Max Planck photometric and spectroscopic survey in the south: EMPHaSSiS

B. Conn^{1,a}, A. Ederoclite², H.-W. Rix¹, N. Martin¹, N. Noël¹, T. Bensby³, R. Lane⁴, G. Lewis⁵, R. Ibata⁶, M. Irwin⁷, T. Beers⁸ and Y.S. Lee⁸

¹*Max-Planck-Institute für Astronomy, Germany*

²*Instituto de Astrofísica de Canarias & Dpto. de Astronomía, Universidad de La Laguna, Spain*

³*Lund Observatory, Sweden*

⁴*Universidad de Concepción, Chile*

⁵*Sydney Institute for Astronomy, Australia*

⁶*Observatoire Astronomique, Université de Strasbourg, CNRS, France*

⁷*Institute of Astronomy, UK*

⁸*Michigan State University, USA*

Abstract. EMPHaSSiS is a photometric and spectroscopic survey of the disk of the Milky Way. The survey covers 33 fields in the 3rd quadrant of the Milky Way and probes every ten degrees in Galactic Longitude between $l = 180^\circ - 280^\circ$ and at Galactic Latitudes of $b = -20^\circ, -30^\circ$ and -40° . Each field is observed in four filters, U, B, V and R, reaching depths of 21.5, 24.0, 23.5 and 23.5 respectively. Spectroscopic observations have been carried out in 11 of these fields and in so doing, main sequence turn-off stars are being traced into the outer disk. This survey will provide metallicities and distances to the stellar populations that reside in the very outer disk of the Milky Way and help trace its evolution with increasing Galactic radius.

1. INTRODUCTION

The outer disk of the Galaxy is, historically, seldom surveyed as it is normally too far from the Galactic Plane to be considered for a disk survey and not far enough to be included in a halo survey. And so the outer Disk, and in particular the Thick disk, is one of the least explored regions of the Galaxy. For the time being it is limited to small portions of the SDSS and stripes associated with the SEGUE data. In the South, there is no real deep coverage although PanSTARRS and SkyMapper are beginning their programmes. This region of the Galaxy is important as relics of the disk formation process are likely to be found here because the dynamical timescales are sufficiently long at these large radii [1]. Substructures which are introduced into the Disk in these regions will remain coherent for extended periods providing an opportunity to catch them as they shape our Galactic disk.

2. PROJECT AIMS

EMPhaSSiS (Fig 1) has been designed to explore regions of the Thick disk that will precede future all-sky surveys and to provide accurate photometry in many bands with some spectroscopic components.

^ae-mail: conn@mpia-hd.mpg.de

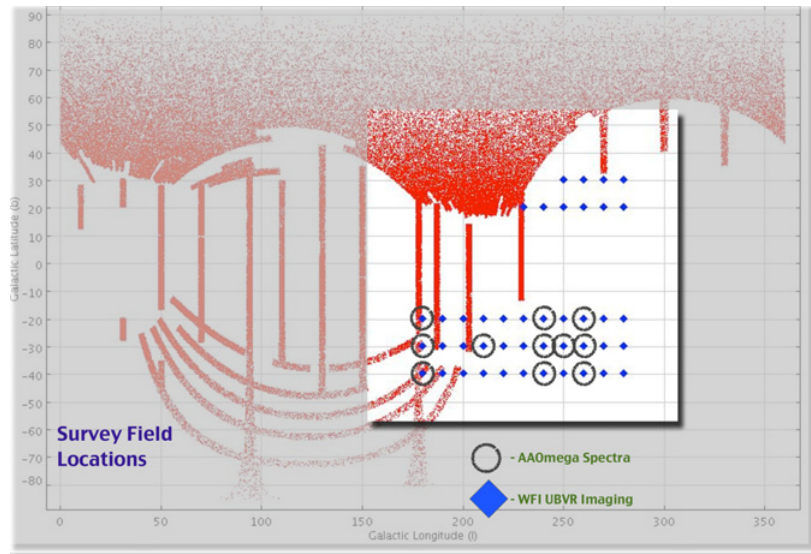


Figure 1. Survey field locations shown in Galactic Coordinates with blue diamonds for the photometric fields and grey circles for the spectroscopic fields. The red points show the footprint of the Sloan Digital Sky Survey and emphasize how this survey extends into regions not reachable from the North.

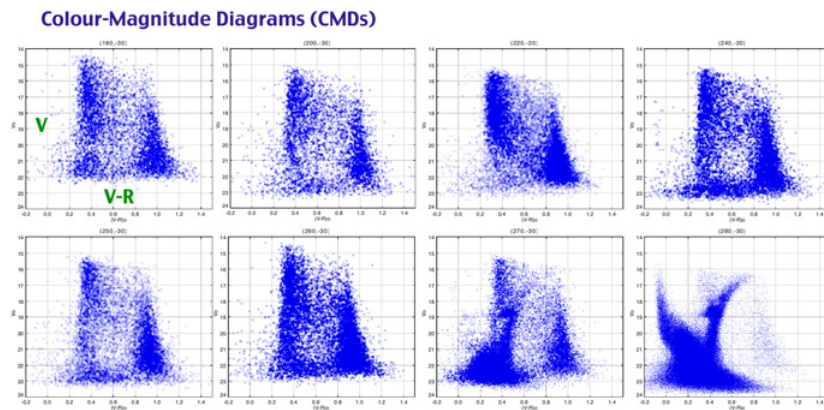


Figure 2. Example Colour-Magnitude Diagrams from around the survey in V and R bands. Several fields have clear detections of the Thick disk of the Milky Way and also the distant Monoceros Ring. In the region near the Large Magellanic Cloud, we can also trace these stellar populations in impressive detail.

In this manner, we aim to probe the density, metallicity and kinematic structures of the outer Disk. The photometric dataset (e.g. Fig 2) will be investigated using the isochrone fitting routines of MATCH, in the manner of [2]. From this, distances and density profiles can be obtained. The spectroscopic dataset is broken into two halves with the low-resolution blue spectra being analyzed using a modified version of the SEGUE Stellar Parameter Pipeline [3] and the higher resolution red spectra being analyzed using the Spectroscopy Made Easy (SME) routines [4]. This will lead to kinematic and abundance information extending out into the Galactic disk.

Assembling the Puzzle of the Milky Way

References

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