Interstellar extinction and Galactic Structure (CT15)

Shashikiran Ganesh

U C Joshi, K S Baliyan

Physical Research Laboratory
Navarangpura
Ahmedabad 380 009
Introduction

We are in the plane of the Galaxy - difficult to understand the structure due to uncertain extinction and distance ambiguity – effect of the dust clouds in the line of sight.

Make use of large scale, broad band, infrared surveys

- e.g. DENIS, 2MASS, etc
- Mid-infrared using observations from ISO (ISOGAL) and Spitzer (GLIMPSEs/GALCEN)

Trace the Red Clump stars in the field ...
Introduction

Two directions in the Galactic plane (disk)

Galactic longitude = 97deg
Northern sky

longitude = -45deg
Southern sky

... bulge
Inner bulge extinction map with 2MASS near IR photometry

Extinction map using J, Ks data and RGB isochrones

Extinction < 40Av only probed in NIR
(e.g. Schultheis, Ganesh, Simon et al., A&A 1999 – DENIS map)
Inner bulge extinction map with Spitzer GLIMPSE-II & GALCEN

Using MIR photometry + MIR RGB isochrones

Extinction > 50Av
in some areas it is > 80Av

Shashikiran Ganesh
IDMC 2011-CT15
IUCAA
23rd November 2011
Interstellar extinction and polarisation in L97 field

The L97 direction
(Ganesh et al., in prep)
Interstellar extinction and polarisation in L97 field

For red clump stars (K2 giants)

\[ M_J = -0.95 \text{ and } M_{Ks} = -1.65 \text{ mag} \]

white curve : RC locus

green dotted curves : RGB isochrones

\[
\begin{align*}
J &= M_J + 5 \log(d/10) + c_J(d/1000) \\
J - K_S &= M_J - M_{Ks} + (c_J - c_{Ks})(d/1000)
\end{align*}
\]
Interstellar extinction and polarisation in L97 field

Full CMD

Observed for polarisation in optical bands (large dots)

Shashikiran Ganesh
IDMC 2011-CT15
IUCAA
23rd November 2011
Interstellar extinction and polarisation in L97 field

DSS image

ISOGAL 7 micron
Interstellar extinction and polarisation in L97 field

R band Polarisation vs near-infrared colour

Shashikiran Ganesh
IDMC 2011-CT15
IUCAA
23rd November 2011
Stellar populations in an ISOGAL field in the galactic disc

The LN45 direction

(Ganesh, Omont, Joshi et al., A&A 2009)
Stellar populations in an ISOGAL field in the galactic disc

2MASS CMD with detections in various surveys
Stellar populations in an ISOGAL field in the Galactic disc
Stellar populations in an ISOGAL field in the Galactic disc
Stellar populations in an ISOGAL field in the Galactic disc

The LN45 direction: $A_v$ and distance with latitude leading edge of the Scutum-Crux spiral arm (4kpc)

Shashikiran Ganesh

IDMC 2011-CT15

IUCAA

23rd November 2011
Stellar populations in an ISOGAL field in the Galactic disc
Summary

★ Extinction (~80mag Av) mapped towards inner bulge (2' resolution)

★ Estimate distance, extinction for stars in a field towards l=97, b=0

★ Optical polarisation measured for mid-infrared selected stars in this field – found to have linear relation with infrared colours

★ Estimate distance, extinction for stars in a large field at l=-45

★ Towards l = -45, c_j varies with distance and latitude

★ In this field the AGB stars found to have ~ small mass-loss rates

★ Large scale NIR surveys not deep enough to probe beyond the edge of first spiral arm in line of sight in directions with large extinction
Thanks