PHOTOMETRIC STUDIES OF THE EXTREME SMC WING

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Among the currently interesting problems of interpreting the Magellanic Stream as an instance of tidal disruption is that of finding some demonstrable phenomenon in the makeup of the involved material that parallels the better known cases of tidal interaction, as for example NGC4038/39, where the dynamic and star-formation time scales are in agreement (Schweizer 1977). The observational problems that beset the interpretation of the Magellanic Stream are numerous (Mathewson and Schwartz 1976, Kunkel 1979, Bregman 1979), and the marked difference between the composition of the Stream (evidenced purely through HI) and the stellar systems (at least 80 percent stars) is among the outstanding dilemmas remaining. Finding some counterpart in the Magellanic scene comparable to the better recognized instances of tidal interaction may go some way towards clarifying a perplexing situation.

This preliminary report describes a photometric study of a field at RA, DEC. = 2^h30^m, -74^o, centered on a dense HI cloud described by Mathewson (1976). CTIO 4-m prime focus plates (B=IIIa-J+GG385, V=IIa-D+GG495) were processed with the PDS/IPPS equipment of the Kitt Peak National Observatory, yielding color-magnitude diagrams (CMD's) to a faint limit at V=22 mag. Through low reddening [$E(B-V) \lesssim 0.05$ at $b_{II}=-44^o$] one finds besides a foreground of Galactic halo stars a young stellar component with a CMD resembling that of the Pleiades. Its age corresponds roughly to 10^8 y.

The young stellar component is distributed between three distinct stellar associations with typical dimensions of 20 arcsec separated from one another by several arcmin. Far less prominent, the general field between these also presents a young population with the same CMD. No other population, and specifically no Magellanic Cloud old halo component, could be readily discriminated against the Galactic halo foreground.

James E. Hesser (ed.), Star Clusters, 353–355.

Adopting provisionally a Salpeter mass function, and assuming that the density of the young stellar field component falls off as the HI of the cloud, one arrives at the result that if the young stars formed as a consequence of a tidal shock, less than 1% of the HI was converted into stars, suggesting thereby that the disruption was surprisingly gentle, lacking almost entirely the dramatic scale of the more spectacular disruptions, and paralleling more closely the more subtle scenarios suggested recently in the work of van der Hulst (1979) on the HI bridge connecting NGC 3077 with M81.

A full account of this work will be published elsewhere.

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DISCUSSION

HARWARDEN: I've seen some calculations by Good which suggest that the surface brightness a little further out in the stream should be only barely above the limit of detectability in terms of what you expect by analogy with the HI density. The HI density, of course, taken in the plane of the disc of the galaxy.

KING: I missed hearing how far from the Small Cloud this is.

KUNKEL: I forgot to say; it's about 8°. In this regard, I feel that we really do have a tidal bridge, because Martha Bruck has measured with COSMOS what appears to be the tidal radius of the SMC. It's somewhere around 5° from the center, so we're about 2 or 3° beyond that.

KING: Is this the first such thing found so far from the center of the SMC?

KUNKEL: I'm not sure. Wamstecker has done some multiband photometry on bright stars in the areas between the two Clouds and he has four stars a little further out than my sample which he suspects might be members of some metal-deficient population.

HARRIS, W.: In the last slide that you showed I noticed that the blue stars mostly lie at or below 20th mag. Depending upon the area you surveyed, I guess you would expect to see a number of quasars and field white dwarfs in there. Can you rule them out?

KUNKEL: The last slide I showed was a PDS example that I thought I should show along with the iris results so you could see they look pretty much alike. No, there is a much larger area that was worked out and then you can actually see that even in the larger area the main sequence slowly creeps back up to magnitude 17.

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