JD 10: LOW-LUMINOSITY STARS

SCIENTIFIC ORGANIZING COMMITTEE
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Most of the mass near the Sun takes the form of stars less luminous than the Sun. A central problem of Galactic astronomy is the determination of how much mass these stars contain.

The only thoroughly reliable way of detecting mass is through its gravitational field. Classically this has been done by studying the Galaxy's rotation curve and the Oort limit, both of which remain active areas of research. In the last few years an exciting new way of probing the Galaxy's gravitational field has been opened up by large surveys for microlensing events. These surveys are yielding important information about the numbers of low-mass objects both in the disk and above it. Another truly dynamical probe for low-luminosity objects is provided by studies of clusters. JD 10 reviewed what we have learned about the density of low-luminosity stars from each of these approaches.

An important orthogonal approach to determining the density of low-luminosity stars involves seperately determining the luminosity function and the mass-luminosity relation for stars of a given spectral class (e.g. main-sequence stars) and then combining them to obtain the mass function. The development of infrared detectors and the refurbishment of the The Hubble Space Telescope have recently yielded important advances in each of these areas. A major difficulty with this line of research is the fact that, in the neighbourhood of $M = 0.08\,\mathrm{M}_\odot$, the main-sequence mass-luminosity relation is (i) steep and non-linear, and (ii) dependent not only on the masses of the faintest stars, but also on their ages, metallicities, rotation rates, binarity etc. Moreover, cool low-luminosity stars have extremely complex spectra, which are difficult to simulate with radiative transfer calculations. Similar difficulties are encountered in the determination of the mass-luminosity relation for white dwarfs. JD 10 reviewed the current status of these very difficult problems.

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J. Andersen (ed.), Highlights of Astronomy, Volume 11A, 409.