Local Galaxies

Dwarf Spheroidal Galaxies

The dwarf spheroidal (dSph) companions of the Galaxy offer a tremendous opportunity to investigate objects at the faint end of the galaxian luminosity function (LF). Their proximity and low stellar densities allow for very deep and relatively uncrowded optical imaging. A major difficulty is their angular size: on the order of a few degrees. Thus wide-field techniques are required to study the global properties of these galaxies.

This review will concentrate mainly (but not entirely) on the use of Schmidt plates for the study of the dSphs. A crucial advantage of Schmidt plate data is that the large field of view (*fov*) allows for a straightforward assessment of background/foreground contamination: even for Sculptor (at $b \approx -83°$), ~45% of all stars in the line of sight with the apparent magnitude of the Sculptor horizontal branch ($m_g \approx 20$) are foreground objects.

Schmidt plate data has been used to study the stellar populations of the dSphs, based both on their stellar LFs and their color-magnitude diagrams. This provides a much better sample of the bright end of the LF than is available with small format CCDs. The large *fov* allows for the determination of the radial profiles of the dSphs based on star counts. However, although different studies tend to agree at small radii, there are significant discrepancies in values for the tidal radii for several systems. The 2-D structure of dSphs have also been investigated from star counts in order to both study radial variations in quantities like the elipticity, and to search for departures from axial symmetry. It remains a puzzle that significant deviations from smooth 2-D structure are known to exist in the three dSphs that have been so studied (Ursa Minor, Sculptor and Fornax).

Stretching the notions of 'wide-field' imaging, important studies of dSphs are also possible with non-Schmidt photographic techniques and Schmidt CCD cameras. These are especially valuable for the more distant dSphs (including Tucana and the M31 companions). The latter technique also provides an enormous improvement in the accuracy and precision of the surface photometry of dSphs over what is possible with plates. Finally, there is also the possibility of imaging studies at other wavelengths. While most of the flux from the dSphs is in the optical/infrared, surprises certainly exist in deep studies at both higher and lower frequencies.

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Absolute Proper Motions of the Dwarf Spheroidal Galaxies in Draco and Ursa Minor

Palomar and Tautenburg Schmidt plates with a base line of about 35 years have been measured with the Automated Photographic Measuring (APM) system in Cambridge (UK) in order to obtain the proper motions of the Galactic dwarf spheroidal satellites (dSph) in Draco and Ursa Minor with respect to a well defined extragalactic reference frame. The investigations were encouraged by the accuracy level achieved for the mean absolute proper motion of galactic globular clusters (0.05 arcsec/century from 25 years base line Tautenburg plate pairs) which is comparable to the expected proper motion of the Draco and Ursa Minor dSph if we assume tangential motions of about 100 km/s. Different methods for the removal of systematic errors in the absolute proper motion introduced by the measuring and reduction process are discussed. The more accurate relative proper motions in both dSph obtained by Stetson (1980) and by Cudworth et al. (1986) providing an external comparison are also used to obtain the mean absolute proper motion of the dSph.

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