The Global Photometric Properties of Nearby Galaxies

M. J. Pierce (Institute for Astronomy, U. Hawaii)

The global photometric properties of galaxies over a wide range of morphological types have been examined. The radius and surface brightness of galaxies change rather abruptly as a function of luminosity, strongly suggesting that the M/L of at least spirals and irregulars begins to increase below a specific luminosity. This increase in M/L also manifests itself as a change in slope of the luminosity line-width relations (Tully and Fisher, 1977, Astr. Ap., 84, 661). The most plausible explanation for this increase in M/L is that low-luminosity systems have a larger relative nonluminous matter content than do high-luminosity systems. It is inferred that variations in the luminous matter content are responsible.

These observations are interpreted in terms of a model for the formation of dwarf galaxies proposed by Dekel and Silk (1986, Ap. J., 303, 39). While the model is successful in predicting many of observational results, in particular the variation in the nonluminous matter content, the model appears to have difficulty, as there remains a strong relation between luminosity and line-width (mass) for dwarf galaxies.

The luminous spiral and elliptical galaxies must have undergone similar collapse factors following their formation, despite the different physics that would appear to regulate their final structural properties. This collapse factor is essentially the ratio of dark to luminous matter. While the connection between this ratio and the collapse factor is simply explained in the case of elliptical galaxies (White and Rees, 1978, M.N.R.A.S., 183, 341), it is somewhat mysterious in the case of spiral galaxies. However, this connection is clearly related to the angular momentum content of spiral and irregular galaxies.

CCD Surface Photometry of NGC 147, IC 1613, and NGC 6822

Jill S. Price (Bentley College), Stephen F. Mason (Computervision Corporation), and Craig A. Gullickson (Lowell Observatory)

Using the 1.1 m telescope at Lowell Observatory and the Bell Labs CCD camera system, high resolution surface photometry has been obtained at four different wavelengths (J, R, I, and Ha) for three dwarf galaxies in the Local Group: NGC 6822, IC 1613, and NGC 147. Each galaxy is searched for dust and young stars. The Ha data is used to calculate star formation rates for the three galaxies.

Session 18: Solar Atmosphere and Dynamics
Display Session, Exhibit Hall

Direct Imager for Nonradial Global-Oscillations

Barry LaBonte (IFA, U. Hawaii)

The Mees Solar Observatory has carried on a series of full disk C II K line photography since Skylab. The K line telescope has been rearranged and equipped with a scientific grade CCD camera (Photometrics Inc., Thompson 384 x 576 chip) to provide synoptic images for solar irradianse studies and times series of images for solar oscillation studies. For full disk images the spatial scale is 5.3 arcseconds/pixel. A Lyot filter is used. Using 0.3 A passband at line center 80% of the light comes from K3, while at a wavelength offset of 0.6 A from line center 93% of the light comes from outside K1. At 0.6 A setting the filter has 2 equal passbands at +/-0.6 A. Oscillations in the 5 minute band have intensity contrasts of at least 3% r.m.s. using 0.3A passband at +/-0.6 A. A 1 minute integration gives a signal-to-noise ratio of 1500:1. This system noise is equivalent to a velocity machine looking at 500 m/sec r.m.s. oscillations with 10 msec noise. A 10 minute integration with 1.2 A passband for irradiance studies can detect network with contrasts as low as 3% of the disk center intensity. Sample images and k-w diagrams will be shown. This work is supported by NASA Grant NSG 7536.

Implications of Recent Estimates of Solar Interior Rotation for Angular Momentum Transport and Dynamo Action in the Sun

P.A. Gilman, C.A. Harrow (Hawaii/NCAR), E.E. Deluca (U. Chicago)

We consider the implications of a newly proposed picture of the sun's internal rotation (Brown et al., 1988) for the distribution and transport of angular momentum and for the solar dynamo. The new results, derived from an analysis of solar acoustic oscillations, imply the only significant radial gradient of angular velocity exists in a transitional region between the bottom of the convection zone, which is rotating like the solar surface, and the top of the deep interior, which is rotating rigidly at a rate intermediate between the equatorial and polar rates at the surface. Thus the radial gradient must change sign at an intermediate latitude. These signatures suggest that the cycle of angular momentum

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