1981

A New Limit on the Luminosity of the Halo of NGC4565 from Infrared Observations

P. R. Saulson

Stephen P. Boughn
Haverford College, sboughn@haverford.edu

Michael Seldner

Abstracts of Papers Presented
(Numbers preceding abstract titles indicate session and sequence of presentation)

29 JUNE 1981
MONDAY MORNING
Invited Paper: 0915–1015 (MacEwan Hall)

01.00 The Age and Size of the Universe, S. van den BERGH, DAO

Session 1: 1030–1200 (A201)
Galaxies

01.01 A New Limit on the Luminosity of the Halo of NGC4565 from Infrared Observations, P.R. SAULSON, S.P. BOUGHN, M. SELDNER, Princeton Univ. We measured the K-band (2.2 micron) brightness of the spheroidal component of the sprial galaxy NGC4565, using the InSb system at the 1.3 meter telescope of KPNO. Comparing the K-band brightness profile of the minor axis with published profiles in visible bands fails to reveal excess infrared luminosity toward larger galactocentric radii, such as would be expected if the galaxy were surrounded by a massive halo made of late-type main sequence stars. Upper limits on the excess brightness, coupled with the mass estimate implied by the published rotation curve, implies that the mass-to-light ratio of the halo material is larger than that of the faintest main sequence stars known. This research was supported in part by the National Science Foundation.

01.02 Discovery of a Carbon Star in the Draco Dwarf Spheroidal Galaxy, M. Aaronson, J. Liebert, J. Stocke, Steward Obs., Univ. of Arizona - A IV-N grism survey has led to the discovery of one (and only one) carbon star in Draco. Optical photometry places the star at the tip of the Draco giant branch, and the measured velocity of -300 km/s is in agreement with the previously determined Draco redshift; hence, membership of the star seems unquestionable. The star is unique among known carbon stars in other dwarf spheroidals in possessing a Balmer emission line spectrum, with unusually strong H alpha; He II 4686 is also present. Preliminary infrared photometry yields M_{bol} = -3.5 mag, and a warm effective temperature (about 4000 K). In the HR diagram the star thus falls near the giant branch tips of metal-poor galactic globulars, and in this respect is similar to the low luminosity carbon stars found in Sculptor and Carina. The theoretical core mass - luminosity relation places an upper limit on the star's age comparable to galactic globulars. Nevertheless, by analogy with the intermediate-age systems in the Magellanic Clouds, the presence of a carbon star in Draco suggests that an extended period of star formation occurred there. This provides a natural explanation for the spread in metallicity seen on the Draco giant branch, via chemical enrichment through successive generations of stars.

This work was partially supported with funds from the National Science Foundation.

01.03 Simulations of Clusters of Galaxies. E. M. MALUMUTH and D. O. RICHSTONE, University of Michigan. -- The dynamical evolution of a cluster of galaxies after virialization is investigated by means of numerical simulations. Orbits chosen from a King model are followed under the influence of the cluster potential. The effects of dynamical friction, mergers and tidal stripping are calculated. About 10 simulations were conducted with different statistical realizations of the same initial cluster parameters. Each simulation produces an object more massive than any of the original galaxies, located near the cluster center. The mass of the most massive galaxy varies by a factor of 3 from model to model. During the simulation, considerable debris is released in the cluster, and the distribution of the brighter galaxies becomes more centrally condensed. Despite the fact that many galaxies suffer large mass changes, an initial mass function resembling Schechter's (1976 Ap.J. 203, 297) does not evolve catastrophically. These simulations produce models which resemble cD and spiral poor clusters in many respects.