33.05

The Nuclear Regions of NGC 3311 and NGC 7768 Imaged with the HST Planetary Camera

C. J. Grillmair, S. M. Faber (UCO/Lick Observatory), T. R. Lauer (KIPNO/NOAO)

We present high-resolution, V-band images of the central regions of the brightest cluster ellipticals NGC 3311 and NGC 7768 taken with the Planetary Camera of the Hubble Space Telescope. The nuclei of both galaxies are found to be obscured by dust, though the morphology of the dust is quite different in the two cases. The dust cloud which obscures the central 3 arcseconds of NGC 3311 is complex and irregular, while the central region of NGC 7768 contains a disk of material similar in appearance and scale to that recently observed in HST images of NGC 4261. The bright, relatively blue source detected in ground-based studies of NGC 3311 is marginally resolved and is likely to be a site of ongoing star formation. We examine the distribution of globular clusters in the central regions of NGC 3311. The gradient in the surface density profile of the cluster system is significantly shallower than that found by previous investigators at larger radii. We find a core radius for the cluster distribution of 32 ± 8 arcsec. This is five times larger than the upper limit on the core radius of the stellar light and suggests that the central field-star population and the globular cluster system are dynamically distinct.

33.06

Dynamics of Polar Rings in Oblate and Triaxial Potentials

Linda S. Spark (Astronomy, UW-Madison), Magda Arnaboldi (MSSSO, Australia)

A number of early type galaxies show a polar ring of gas, dust and stars lying roughly perpendicular to the apparent major axis of the central galaxy. We have studied the dynamics of a self-gravitating ring which is inclined to the principal planes of a triaxial galactic potential tumbling about its short axis; in a steadily-processing equilibrium state, the precession rate of the ring in the potential must be equal to the tumbling speed of the triaxial figure. As in an oblate galaxy, both stable and unstable equilibria exist: in the tumbling triaxial potential, there are stable equilibria bending towards the equator, if the ring is light, and towards the pole, at higher ring mass. The former are similar to the 'anomalous retrograde orbits', while the latter resemble the stable equilibria for a self-gravitating ring in an oblate potential. Following the time evolution of unstable polar rings shows that in an oblate galaxy potential, even if the ring is not sufficiently massive to be stabilised, self-gravity can still cause the characteristic warp up towards the pole. In the triaxial potential, when the inclination of the polar ring is not such that its precession rate matches the galaxy tumbling speed, the ring can wobble gently in a quasi-periodic manner if it is massive enough, but is disrupted if its mass is too low.

Some polar rings are not mirror-symmetric about the center of the galaxy, but have a banana or 'C' shaped bend: these distortions may represent axisymmetric bending modes. The sideways displacement of an isolated ring or disk represents a neutrally stable mode of zero frequency; in the central galaxy potential, this can become an m=0 bending mode, which remains discrete when the galaxy is not too massive in relation to the ring. The curvature of the mode is sensitive to the core radius of the galaxy halo. The mode is not spontaneously unstable, so the bending must be excited by an encounter, or during the accretion of ring material.

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33.07

A Four-Image Gravitational Lens in MG0751+2716


We report the discovery of a new four-image gravitational lens in the radio source MG0751+2716.

Gravitational lensing occurs when the light from a distant source is deflected by the mass of an intervening lens. Since the gravitational deflection traces the total mass of the lens, gravitational lenses can be used to probe the dark matter distribution in galaxies. This approach can provide an important confirmation of dynamical mass profile determinations, and the lensing galaxies are typically at very great distances (\(r \sim 1\)).

MG0751+2716 was discovered as part of the MIT-Greenbank-VLA search for gravitational lenses (Hewitt 1986, Conner 1993, MIT Ph.D. theses), and consists of four compact radio components. High resolution MERLIN maps show an unresolved arc extending between the two brightest images. We present radio and optical observations of this system, and preliminary models of the lensing mass.

Session 34: HAD
Oral Session, 2:15-3:45 pm
Salons A/B

34.01

George Ellery Hale, Ernest Fox Nichols, and Radiometry at the Yerkes Observatory

R.S. Brashear (Huntington Library)

In the 1890s, George Ellery Hale, Director of the Yerkes Observatory, attempted to detect the solar corona when the Sun was not in eclipse. His failure to detect the corona optically led him to see if he could discover any indications of coronal heat with the use of bolometers. At first, Hale wanted to find coronal heat during a total eclipse in order to determine whether the heat was significant enough to be measurable out of eclipse. Hale would often try to enlist the aid of others traveling to distant eclipse sights by asking them to perform certain bolometric observations. Ernest Fox Nichols's work with the modified Crookes radiometer led Hale to attempt to appropriate Nichols for his coronal research. Hale's scheme backfired when Nichols insisted on measuring stellar heat, not coronal heat. Although Hale was initially disappointed, Nichols's results at Yerkes made Hale realize the potential value of radiometric research in astrophysical problems.

34.02

Walter Baade and the Southern Hemisphere

D.E. Osterbrock (UCO/Lick Obs, UCSC)

The inception of the European Southern Observatory is generally traced to Walter Baade's discussions with Jan Oort during his visit to Leiden in the spring of 1953. However, these discussions had certainly been underway between them previously, during Oort's visit to Pasadena in early 1952. Furthermore, Baade's great interest in southern-hemisphere astronomy and his strong desire to observe there can be traced far back in his career.

In 1927, after his return to Germany from a year in the U.S. under a Rockefeller fellowship, Baade reported that his country had no chance to catch up with American astronomy in the northern hemisphere. He advocated moving the Hamburg 1-meter reflector to the southern hemisphere to get in ahead of the U.S. with an effective telescope there. Baade emphasized the research that could be done on high-luminosity and variable stars in the Magellanic Clouds. Later, after he had joined the Mount Wilson staff, his early attempts to locate the center of our Galaxy and globular clusters near it (in 1937) and his observational study (with Edwin Hubble) of the Sculptor and Fornax dwarf galaxies (in 1939) re-emphasized to him the need for a southern observatory.