sity of Michigan.—NGC 4486-B, called a compact galaxy by Zwicky, is a Virgo Cluster E0 galaxy 7:3 north preceding NGC 4486 (M87). In this study, some physical properties of NGC 4486-B have been determined.

The distribution of photographic surface brightness was derived from microdensitometer tracings of several 100- and 200-in. plates. Typical atmospheric-instrumental profiles had dispersions of 1"–1:5. The intensity profile of M87, photoelectrically determined by Baum, was used for calibration. The surface brightness decreases with distance from the image center, r , approximately as $r^{-1.9}$ for $2'' \lesssim r \lesssim 4:8$ and $r^{-3.1}$ for $4:8 \lesssim r \lesssim 13''$. The region $r \lesssim 4:5$ has a flatter brightness gradient relative to the region $r \gtrsim 4:5$ than is predicted by de Vaucouleurs' empirical relation for the brightness distribution of an elliptical galaxy. King's empirical relation for the brightness distribution of a globular star cluster approximately fits the observations when a core radius of 1" and a limiting radius of 30" are adopted.

A total mass $M = 5 \times 10^{10} M_{\odot}$ is deduced from the virial theorem, when one employs the adopted brightness profile based on King's relation, an internal radial-velocity dispersion of 370 km/sec (determined by Minkowski) and the following two assumptions: (1) The mass and luminosity have identical spatial distributions. (2) The internal velocity dispersion is isotropic and independent of stellar mass. The total apparent magnitude derived from the observed brightness profile is $m_{pg} = 14.2$. This corresponds to an absolute magnitude $M_{pg} = -16.7$. The resulting mass-to-light ratio is $M/L_{pg} = 80 M_{\odot}/L_{pg\odot}$.

NGC 4486-B may be a tidally limited satellite of M87. The estimated masses, 7:3 projected separation, and 200 km/sec radial-velocity difference of these galaxies suggest that they probably form a bound pair. The observationally derived limiting radius of NGC 4486-B is consistent with that based on the theoretical formula for tidal cutoff radius.

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KO Aquilae as an Example of Close Binary Systems with Undersize Subgiant Secondaries in Pre-Main Sequence Contraction. IAN W. ROXBURGH, *High Altitude Observatory, and King's College, University of London.*—The hypothesis is advanced that close binary systems with an undersize subgiant secondary are in the pre-main sequence evolutionary phase, and applied to the system KO

Aquilae. Since KO Aquilae is a single spectrum binary a complete description of the system can be obtained by supposing that the primary is contracting towards the main sequence, and the age of the system is found to be 3.5×10^{13} sec, the mass of the primary $2.9 M_{\odot}$ and the secondary $0.58 M_{\odot}$. The radius of the primary is found to be $2.6 R_{\odot}$ and that of the secondary $2.1 R_{\odot}$, while the distance between the mass centers is $13 R_{\odot}$. To confirm our hypothesis we compute the radius of a star of $0.58 M_{\odot}$ after 3.5×10^{13} sec and this is found to lie between $1.9 R_{\odot}$ and $2.3 R_{\odot}$, in good agreement with the previous determination. The angular momentum of the system is computed and is found to be in satisfactory agreement with the predictions of the fission theory as advanced by Roxburgh (1965).

Review Paper: A New Era in Cosmology: The Use of Radio Galaxies, Quasi-Stellar Sources and Quasi-Stellar Galaxies as Probes. ALLAN R. SANDAGE, *Mount Wilson and Palomar Observatories.* (Read by Roger Lynds.)

Stellar Interactions and the Evolution of Galactic Nuclei. WILLIAM C. SASLAW AND LYMAN SPITZER, JR., *Princeton University Observatory.*—Interactions among stars affect the evolution of compact, nearly spherical galactic nuclei. In order of increasing influence, these interactions are gravitational radiation (an exact two-body solution is found), tidal encounters, and stellar collisions. Initially, loss of high-velocity stars and energy dissipation in tidal encounters cause the system to contract. As the collision frequency increases, much gas is liberated. The fractional mass loss per collision ζ is evaluated on a very simple model considering only the energy and momentum of colliding mass elements, neglecting all hydrodynamic effects. Mean values of ζ range from 0.03 for a rms stellar velocity V_s of 1400 km/sec to about 0.10 for $V_s \approx 10,000$ km/sec. Nuclear explosions in which increased nuclear reactions double the energy density of colliding mass elements in a time $= 2R_*/V_s$ occur for $V_s \approx 3000$ km/sec in head-on collisions. Decrease of the stellar velocity resulting from an off-center collision is negligible. The liberated gas radiates, cools, and falls to the center of the system. Angular momentum produces a flat disk whose density increases until new stars form. A typical disk has a density of about 10^9 atoms/cm³ and a thickness of several hundred a.u. Newly formed stars absorb kinetic energy from stars in the nucleus and the contraction accelerates until the relaxation time substantially exceeds the time required for a star to be destroyed by collisions. For typical parameters, initial angular momentum does not substantially inhibit