Luminosity Classification of Galaxies and Some Applications. G. DE VAUCOULEURS, *University of Texas.*—Van den Bergh (*Publ. David Dunlap Obs.* **2**, No. 6, 1960) has published a luminosity classification from morphological criteria for 436 spiral galaxies of the Shapley–Ames Catalogue. This scale was statistically tested for possible systematic effects depending on declination and galactic latitude; no significant correlation can be detected other than a slight excess of high-luminosity systems in low galactic latitudes probably due to selection effects in the Shapley–Ames Catalogue. The calibration of luminosity classes in terms of absolute magnitude was derived from residuals in the velocity–magnitude relation using improved magnitudes in the B system corrected for galactic absorption (m_c) and an enlarged list of redshifts (V_0). If $\mathfrak{L}=1, 2, 3, \ldots, 9$ for DDO classes I, I-II, II, ..., V, than a least-squares fit through the relation

$$\log V_0 = \text{const} + 0.2(1+\mu)m_c - 0.1(1+\lambda)\mathfrak{L}$$

gives $\mu = +0.048 \pm 0.047$ (m.e.), and $\lambda = -0.029 \pm 0.050$ ($8 < m_c < 14$; $n = 231$ galaxies), i.e., a negligible correction to the previously assumed ratio $\Delta M/\Delta\mathfrak{L} = 0.50$ (de Vaucouleurs, *IAU Symp.* No. 15, p. 9, 1962) and in the mean (over a large area of the sky) a negligible departure from the theoretical slope of the $V(m)$ relation.

Van den Bergh's data can be used to check Van Albada's suggestion (*IAU Symp.* No. 15, p. 411, 1962) that the anisotropy of the velocity–magnitude relation (de Vaucouleurs, *Astron. J.* **63**, 253, 1958) for nearby galaxies is due to systematic variations with direction of the absolute magnitude of galaxies having a given type and magnitude. The tests give little support to this hypothesis and systematic departures in the $V(m)$ relations in different parts of the sky remain even when allowance is made for luminosity effects. For example, spirals having distance moduli $30 < m_0 - M(\mathfrak{L}) < 31$, according to Van den Bergh's data, have mean velocities ranging from +1100 km sec^{-1} or less near the north galactic pole to +1500 km sec^{-1} or more near the south galactic pole. These results from a selected sample (spirals with DDO luminosity class north of $-27°$ declination) are in agreement with the results of a new discussion of the velocities and magnitudes of 749 galaxies of all types, including the southern sky.

Luminous and Ionizing Efficiencies of Meteors. FRANCO VERNIANI (introduced by Gerald S. Hawkins), *Harvard College Observatory.*—The ratio of the photographic luminous efficiency τ_p to the square of the density of about 400 Super-Schmidt meteors, precisely reduced by Jacchia, has been computed directly from observational data, taking into account fragmentation. After allowing for the different mean densities of meteors in short-period and long-period orbits, the correct dependence of τ_p on the meteor velocity v is found in the form $\tau_p = \tau_{0p} v^n$. The exponent n turns out to be 1.0 ± 0.15 for both faint and bright meteors. Four meteors with asteroidal characteristics yield $\tau_{0p} = 1 \times 10^{-19}$ zero mag g^{-1} cm^{-3} sec^4, which agrees well with the value inferred by McCrosky and Soberman (*Smithsonian Contrib. Astrophys.* **1**, 199, 1963) from the results of artificial meteors. The analysis shows no dependence of τ_p on mass or brightness and fails to detect any appreciable change of τ_p along the trajectory. Moreover the results show that τ_p is independent of atmospheric density. Using this value of τ_{0p} we find the mean density of the super-Schmidt meteors to be close to 0.3 g cm^{-3}, in agreement with Whipple's cometary model. The present evaluation of τ_p, together with the results of the simultaneous radio and photographic observations of Davis and Hall [*Proc. Roy. Soc.* (*London*) **A271**, 120, 1963] allows the determination of the ionizing efficiency, τ_q, at $v = 32$ km/sec. Using Millman and McKinley's data (*Can. J. Phys.* **34**, 50, 1956) which relate durations of radio echoes and visual magnitudes Hawkins and the author have found $\tau_q \sim v^2$. The comparison of the rates of photographic and radio meteors of about the same magnitude confirms this relation. The combined result is $\tau_q = 6 \times 10^{-17} v^2$ with v in cm/sec. Accordingly, the relation between photographic magnitude M_p and electronic line density q is independent of velocity and reads: $M_p = 3.4 - 2.5 \log q$, with q in electrons/cm.

The Two-Level Atom Revisited. J. WADDELL, *Kitt Peak National Observatory.*—The two-level atom problem formulated in energy space by Warwick (*Astrophys. J.* **121**, 190, 1955) and Thomas (*Astrophys. J.* **125**, 260, 1957) may be demonstrated to be incapable of exact formulation. Three difficulties of principle are encountered: (1) the inability to distinguish between photon numbers and photon energy; (2) the introduction of normalized Einstein coefficients which in turn violate the Einstein relations; and (3) an erroneous treatment of stimulated emission, which when properly accounted for, does not permit an angular dependence in the scattering term. The basic difficulty arises from the fact that non-LTE is unable, in principle, to account for finite linewidths. Some of these difficulties appear to be eliminated if the non-LTE problem is formulated in momentum space rather than the customary energy space.