multiplied by an exponential function $s = f(r, \delta, \beta)$, where $Q = \sum n_1 \bar{m}_0$ ($\bar{m}_0$ is the mean rest mass of the elementary particle, a number n of which constitute the protostar), r is its radius, $\delta = Q/(4/3)\pi r^3$, and $\beta = 4.46 \times 10^{-12} \text{ cm}^2/\text{g}$ is the coefficient of radional absorption. Thus $M = Qs$, where

$$s = 1 - (3/4)r\delta\beta + (2/5)(r\delta\beta)^2 - \dots + (-1)^{k-1}3(2r\delta\beta)^{k-1}/k!(k+2)\dots,$$

representing the measure of interaction between Q of a spherical protostar and the radional field. Insofar as M varies according to the equation given above when its radius r decreases in the course of the star's evolution, its angular velocity and centrifugal force increase, and its internal radiative pressure varies also. Such conditions may lead to pulsation of the star with gradually increasing amplitude until a spheroidal layer is expelled from the surface of the star, expanding concentrically around it under the action of initial impulse, centrifugal force of the shell's axial rotation, and high radiative pressure from the "naked" star. When the expansion of such a dust-and-gas shell is checked by the force of the star's gravity, the matter of the shell slides by isobaric surfaces of both polar hemispheres "down" to the shell's equatorial bulge. Two whirling rings similar to Lord Kelvin's smoke rings are formed on both sides and parallel to the equatorial plane of the shell. Under gyrostatic law the rings of stellar matter break into spinning planetesimals which revolve around their "mother star," and form a planet and its satellites. This theory is found to be consistent with observations.

Observations of the Optically Thin Scattering Layer in the Atmosphere of Venus. BRADFORD A. SMITH AND WALTER E. BAINS, *New Mexico State University*.—The existence of an optically thin scattering layer overlying an opaque surface on Venus was established through observations of cusp extensions near inferior conjunction by visual observers during the 18th and 19th centuries. H. N. Russell (*Astrophys. J.* **9**, 284, 1899) was probably the first to publish a correct analysis of these observations. He concluded that a relatively bright haze layer extends upward somewhat more than 1 km above the top of the opaque cloud cover, and that a much weaker layer reaches a height of 10 km. A photographic study of the cusp extensions was first undertaken by J. B. Edson (*Proc. Lunar Planetary Explor. Coll.* No. 5, 22, 1959) and his co-workers in 1938 and 1940. Edson not only gave photographic confirmation to the earlier visual observations, but also established that the extension angles of the two cusps are usually asymmetric.

More recently, photographic observations have been made at the New Mexico State University during the inferior conjunctions of 1959, 1961, and 1962. In addition to confirming Edson's observations, the New Mexico photographs indicate the probable existence of very weak scattering at heights as great as 30–40 km above the opaque surface. The analysis of these observations, however, is unfortunately complicated by the possibility that the level of the effective opaque surface on Venus may not be identical under all terrestrial observing conditions.

A composite of the heights published by Edson and those obtained by the writers (at elongation angles less than 10 degrees) suggests a symmetry about an axis nearly perpendicular to the orbital plane. Symmetry about any axis other than the orbital radius vector can be produced only by rotation. Our observations, then, tend to conflict with the current concept of synchronous rotation of Venus.

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Absorption Coefficient of Quasi-Molecular Hydrogen. PHILIP M. SOLOMON, *Washburn Observatory*.—The continuous absorption of quasi-molecular hydrogen ($H+H$), is due to transitions from the unstable $^3\Sigma_u^+$ state to the excited stable $^3\Sigma_g^+$ state. The H_2 continuous emission spectrum is the inverse of this process. The absorption coefficient of this system has been calculated with the condition of thermodynamic equilibrium by a detailed balancing of the emission from and absorption into the stable upper state. The number of bound molecules in a vibrational level v' is determined as a function of the density and temperature and the emission coefficient per unit frequency interval is calculated for $v' = 0-8$. Combining the above, the absorption coefficient is calculated for $1500 < \lambda < 6000 \text{ \AA}$.

The coefficients are less than 1% of the values derived by Erkovich (*Opt. Spectry.* **8**, 162, 1960). It is suggested that this difference is due to Erkovich's use of an unrealistically large collision diameter.

Comparison between the quasi-molecular absorption and that of H^- and H shows that the contribution of quasi-molecular hydrogen to the total opacity is extremely small in all types of stellar atmospheres and it is not the unknown opacity source in the sun.

Calculation of Early-Type Model Stellar Atmospheres. S. E. STROM AND E. H. AVRETT, *Smithsonian Astrophysical Observatory*.—The itera-