Temperature Effects in Photomultipliers. J. D. FERNIE, *David Dunlap Observatory*.—A photoelectric photometer employing an unrefrigerated EMI 6094A photomultiplier is in use with the 19-inch aluminized reflector of the David Dunlap Observatory. Transformation equations from this instrumental system to the *UBV* system have been determined in both summer and winter at average temperatures of $+70^\circ$ and -5°F , respectively. No significant variations in the transformation coefficients are found over this range in temperature. It is considered unlikely that effects of mirror-aging can be compensating for a temperature effect, although this possibility remains to be examined observationally.

Wave Propagation and Screening in a Dense Two-Component Plasma. J. S. GOLDSTEIN, *Brandeis University*.—We consider the propagation of small-amplitude waves in a dense degenerate plasma ($\rho \sim 10^6\text{--}10^9$ g/cc, $T \sim 10^8\text{--}10^9$ °K) such as may exist in the core of presupernova, or in very dense white dwarfs. The effect of ion motion is included. The results may be extended to zero frequency to obtain the screening length; the results of Cameron (AECL Chalk River, Do PD-312, 1959) on nuclear reaction rates at high density are confirmed. For nonzero frequencies, the dispersion relation is obtained for the medium. At low frequencies, the principal propagation mode is in the ion plasma, while at high enough frequencies, propagation in the electronic component dominates. The role of zero sound is considered, and may be expected to become important in the case of a neutron core, and in some cases in the presupernova core. The formation of shock waves in these media is discussed.

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Absorption Lines Produced in Interstellar Grains. J. MAYO GREENBERG AND PEARL R. LICHTENSTEIN, *Rensselaer Polytechnic Institute*.—The wavelength dependence of extinction has been computed for various size distributions of spherical particles using the best available estimate of the wavelength dependence of the complex index of refraction for "dirty ice." The computations are made with Mie theory results for the total cross sections of spheres of arbitrary size. The effect on the index of refraction produced by a small admixture of material having a resonance line in the neighborhood of $\lambda 4430$ has been estimated by assuming the order of one atom of *Ca* per thousand water molecules in a grain. For distributions of particles which give a ratio of total to selective extinction equal to 3, it

is shown to be possible to produce an extinction line whose strength is of the order of that observed for the $\lambda 4430$ line. The strength of the line decreases with increasing A/E and, as is to be expected, becomes an emission line for sufficiently high A/E .

Redshift of the Radio Source 3C 48. JESSE L. GREENSTEIN, *Mount Wilson and Palomar Observatories*, AND THOMAS A. MATTHEWS, *Owens Valley Radio Astronomy Observatory*.—The radio source 3C 48 has been announced to be a star because of its small radio diameter and stellar appearance on direct plates. The recent discovery of the Balmer series in 3C 273 by Schmidt and Oke and the consequent large redshift $\Delta\lambda/\lambda_0$ of 0.158 suggests the possibility of a large redshift for 3C 48. On this basis a number of emission lines have been identified with lines of *Mg II*, [*Ne III*], [*Ne V*], and [*O II*]. The redshift is 0.3675 or 110 200 km/sec.

The possibility that the source is a nearby ultra-dense star of radius near 10 km and containing neutrons is ruled out from a spectroscopic point of view. Interpreting 3C 48 as the core of a peculiar galaxy, the distance is estimated to be 1.1×10^9 pc. The absolute visual magnitude, corrected for redshift effects, may be as bright as -26.3 , at least 10 times brighter than the brightest elliptical galaxies. In the visual spectrum 3C 48 radiates about 50 times more powerfully than 3C 295 or Cyg A, but comparably with 3C 273. As a radio source 3C 48 is rather similar to 3C 295 and Cyg A. Due to its small angular diameter the surface brightness is very high. The integrated radio emission of 3C 48 is comparable with that from 3C 295, being 4×10^{44} ergs/sec. At a distance of 1.1×10^9 pc the radio and optical emission must be confined within a diameter 5500 pc.

Theoretical Photometric Function for the Lunar Surface. BRUCE HAPKE, *Center for Radiophysics and Space Research, Cornell University*.—A formula which describes the observed photometric properties of the lunar surface is derived theoretically. Functions for both the differential and integral brightness are obtained. The model surface on which the derivation is based consists of a semi-infinite, porous layer of randomly placed, obscuring objects; these objects are suspended in depth in such a manner that the interstices which separate them are interconnected. A layer of fine, loosely compacted dust is in the category of surfaces described by this model, but volcanic foam is not. The shape of the photometric curve depends on the fractional void volume. Bulk densities of the order of one-tenth that of solid rock are implied for the upper layers of the surface of the moon.