This work has been carried out under a contract from the U. S. Air Force.

Supergiant Eclipsing Binary BM Cas, CHENG-YUAN SHAO AND SERGEI GAPOSCHKIN, *Harvard College Observatory*.—On the plates of the Harvard Patrol Collection, 6037 photographic estimates were obtained for this eclipsing system. We observed the behavior of the variable over an interval of more than 50 years and confirmed the irregularities in its maximum brightness shown by the photographic observations in the 1930's, particularly the "hump" (0^m16) immediately after the primary minimum that seems to be a permanent feature of the system. The photographic light curve is tabulated in an abbreviated form:

0 ^p 000	9 ^m 88	0 ^p 475	9 ^m 96	0 ^p 600	10 ^m 23	0 ^p 800	9 ^m 86
0.100	9.90	0.500	10.07	0.650	9.94	0.850	9.76
0.200	9.92	0.525	10.25	0.700	9.78	0.900	9.85
0.300	9.83	0.560	10.34	0.735	9.69	0.950	9.85
0.400	9.86	0.575	10.32	0.775	9.79	0.975	9.86

The photoelectric observations, covering one complete cycle, were obtained in three colors on 56 nights during 1961–62. We used a photometer attached to the 24'' reflector at the George R. Agassiz Station of the Harvard College Observatory. The effective wavelengths of our system are similar to those of the *UBV* system. A 1P21 photomultiplier and a Brown recorder were used. The photoelectric light curve is similar to the photographic one, but shows detailed features:

(1) The ranges of light variation of this system are $y=0^m605$, $b=0^m633$, $u=0^m841$, $b-y=0^m071$ and $u-b=0^m221$.

(2) The hump after the primary minimum is sharply defined and becomes more pronounced towards shorter wavelengths. Its amplitudes are about 0^m126 in yellow and 0^m279 in ultraviolet lights.

(3) Other secondary fluctuations, especially strong before and after the primary minimum, appear on both the light and the color curves.

(4) The color curves also indicate that the system has the largest color indices a few days after, possibly also before the mid-eclipse, but not during it.

The photometric elements of BM Cas are: Min. = JD 2433859.0+197^d31E; $m_1=10^m34$, $m_2=9^m92$, $Mx=9^m69$ (hump); the phase of the primary minimum is 0^p56 (arbitrary).

Since the system is a Beta Lyrae type and the secondary minimum is small and irregular, its dimensions are difficult to derive with certainty. They are, however, between those found by G. Thiessen (*Z. Astrophys.* **39**, 65, 1956) and S. Gaposchkin (*Harvard Ann.* **113**, No. 2, 1953).

A Cislunar Orbit (IMP). BARBARA E. SHUTE, *Goddard Space Flight Center*.—The orbital changes of a proposed cislunar satellite (IMP) have been investigated. Under the disturbing influence of the moon, the eccentricity changes from 0.95 to 0.85 in one year and the inclination (to the equator) moves from 33° to 48°—that is, a change of 15° with respect to the equator or 25° with respect to the plane of the ecliptic. In six years, the eccentricity decreases to a minimum of 0.209 and returns to 0.95 in 12 years, but perigee at this time is approximately 1 earth radius, indicating the demise of the satellite. The case quoted above assumes a ratio of semimajor axes of satellite to moon, $a/a'=3$, equivalent to a satellite period about 6 days. (Orbital changes are *not* due to sharp commensurability of the mean motions of the moon and satellite.) The other parameters are e_0 (eccentricity)=0.95, i_0 (inclination)=33°, ω_0 (argument of perigee)=270°, Ω_0 (right ascension of the ascending node)=270°. Other cases of Ω_0 have been investigated. Since consistent results were obtained from two independent and structurally different numerical integration programs (one based on Encke's method, the other Halphen's method) which were developed by two independent investigators, the above changes must be taken as conclusive. Inclusion of the earth's oblateness J_2 and solar perturbations do not give significantly different results.

Deceleration of Radio Meteors. RICHARD B. SOUTHWORTH, *Smithsonian Astrophysical Observatory*.—Meteors observed with the six-station system of the Harvard Radio Meteor Project show rates of deceleration from 5 to 30 or more km/sec². Among shower meteors, the first velocity observed for any one meteor is some one to three km/sec below the no-atmosphere velocity.

Decelerations of this size are predicted by the classical single-body theory, but are also consistent with fragmentation of the meteoroid. Somewhat less than half of the meteors show evidence of fragmentation; either the Fresnel oscillations damp out faster than they would under diffusion alone, or the ionization curve is irregular.

Plasma resonance in the ion column seriously disturbs velocity measures from the Fresnel patterns of meteors of about magnitude 6 or brighter. The average effect, predicted and observed, is a spurious acceleration. Possibly this effect has prevented earlier deceleration measures.

Turbulence in the Chromosphere. Z. SUEMOTO, *The Observatory, University of Michigan*.—On our spectrograms of 1958 eclipse one can trace spicule structures as far down as 1500 km. Resemblance of these structures for all lines including even He I lines