physical characteristics. Perhaps the semiregular variables with fairly strong Balmer emission should be grouped together in one class.

We are indebted to the National Science Foundation for its support, and to the Mount Wilson and Palomar Observatories for the Coudé observing time.

New Hydrogen-line Survey of the Galactic Center Region. FRANK J. KERR, *CSIRO Radio-physics Laboratory, Sydney, Australia* (temporarily at University of Texas and University of California, Berkeley).—An extensive hydrogen-line survey at low galactic latitudes is being carried out with the Australian 210-ft steerable telescope and a 48-channel receiver. Particular attention is being given to the galactic center region.

The "3-kpc expanding spiral arm" is found to have a complex structure, especially near $l \approx 348^\circ$. The location of this arm has been derived from its apparent tangential situation at 333° , but, if we are not dealing with a single continuous feature, this distance estimate may require revision.

The rapidly rotating disk and ring close to the center (Rougeot and Oort, *Proc. Natl. Acad. Sci.* **46**, 1, 1960) can be clearly seen, but they are asymmetrical in form. This asymmetry is related to some general asymmetries which seem to be an important feature of the whole central region. The ring, and possibly the disk, show some outward motion in addition to their rapid rotation. The disk is closely in the galactic plane, but the ring is inclined to the plane at an angle of about 12° .

Very striking absorption effects are observed in the immediate vicinity of the center. Most of the components of the absorption, which extend over 2° of longitude, can be identified with particular features of the hydrogen distribution. The absorption is mainly at negative radial velocities, associated with outward gas motions in the nucleus, but some absorption also occurs at positive velocities. In considering the whole absorption pattern, we must conclude that either (i) there is some inward gas motion or (ii) the center of rotation does not coincide in position with the main peak of the Sagittarius A source.

A 20-cm continuum survey has also been carried out in the central region.

Rapid-Response Photometry of Satellites. K. E. KISSELL, *Aerospace Research Laboratories*, AND E. T. TYSON, *Avionics Laboratory, Wright-Patterson Air-Force Base*.—From examination of kinescope recordings of transits of some orbiting upper stage rockets, it was apparent that complex periodic fluctuations were occurring in the apparent bright-

ness of these objects. A rapid-response photometer system was designed and built by one of us (ETT) for the purpose of time resolving the bright flashes noted by visual telescopic observation.

The photometer allows flat response to optical signals from dc to 5 kc. It consists of a photomultiplier/cathode follower head, feedback electronics to provide near-logarithmic response over a range of 10 stellar magnitudes, and an fm tape recorder. Playback is effected through a light-beam galvanometer recorder. The photometer is mounted on a Nunn 3-axis mount with 12-in. $f/5$ optics. Tracking has been possible with field apertures of 2 to 15 min of arc.

Light curves of numerous vehicles have been obtained. As expected, some of these show surprising repetitive detail related to surface configuration. Satellites with minimum brightness of $+5$ to $+7$ stellar magnitudes have been recorded through the entire light curve. Spin axis orientation and vehicle axis orientation can be deduced in some cases.

Short-Period Variation in a Beta Cephei Variable.

BENNY L. KLOCK, *Georgetown College Observatory and U. S. Naval Observatory*.—Photoelectric observations, made with the 12-in. refractor at Georgetown College Observatory, are reported for the Beta Cephei variable, HD 21803. The variability, first detected by Lynds (*Astrophys. J.* **129**, 674, 1959), is noted to contain short-period fluctuations of the duration of 15 min, or less, superimposed on the longer periods. The longer periods (0^d2018 and 0^d1982), along with their beat frequency (0.090 cycles/day), were determined through an analysis of the data on the E101 computer at Georgetown College Observatory and the IBM 1410 computer at the U. S. Naval Observatory. A comparison of the computed light curve with the observed light curve yielded a probable error of 0^m005 .

It is suggested that this star appears to be in an advanced stage of evolution off the Beta Cephei region of the H-R diagram. The variation of line-width in the star noted by Struve (*Astrophys. J.* **129**, 668, 1959) may confirm the existence of a variable rotational velocity predicted by Oliinik and Porfir'ev (*Soviet Phys.—A. J.* **7**, 588, 1964). The short-period variations in the light curves are probably related to similar variations in the star's rotational velocity.

Spectral Investigation of Selected Bright Eclipsing Binary Systems. ROBERT H. KOCH, EDWARD C. OLSON, AND KENNETH M. YOSS, *Amherst College, Rensselaer Polytechnic Institute, and Mt. Holyoke Col-*