uniform density. In the former case tidal forces tend to draw the perturbation into a prolate spheroid.

Absolute Spectra of the Strongest Nonthermal Radio Sources in the Wavelength Range between 2 and 100 cm. J. W. M. BAARS, P. G. MEZGER, AND H. WENDKER (introduced by D. S. Heesch), *National Radio Astronomy Observatory*.—Relative flux measurements made with the NRAO 85-ft telescope at 5 and 14.5 GHz showed that the results are not compatible with straight spectra for both Cassiopeia and Taurus. In order to investigate this problem eight absolute measurements of the Cassiopeia flux within the frequency region $320 \leq \nu \leq 9360$ MHz were reduced to the epoch 1964.4, adopting a secular decrease of the flux of 1.1%. In view of the high absolute accuracy of these measurements it is not possible to extend the straight spectrum beyond 4 GHz. As a next step, four absolute flux measurements of the Taurus spectrum were combined with measurements below 3 GHz relative to Cas A. It turns out that the resulting spectrum of Taurus can be fitted by a straight line with constant spectral index $\alpha = -0.25 \pm 0.015$ up to 9.4 GHz. Extrapolating the Taurus spectrum to 14.5 GHz and combining it with relative measurements at 5, 8, and 14.5 GHz leads to a spectrum of Cassiopeia which has a kink between 4 and 7 GHz. The spectral index below 4 GHz is -0.72 ± 0.02 and above 7 GHz it is -1.12 ± 0.13 but here the experimental data are not sufficient to exclude the possibility that the curvature of the spectrum increases in this region.

Relating the relative measurements of the flux of Cygnus and Virgo to the Cassiopeia spectrum for frequencies below 4 GHz and to the Taurus spectrum for higher frequencies leads to the spectral index $\alpha = -0.82 \pm 0.02$ for Virgo A and $\alpha = -0.88 \pm 0.03$ for $0.3 \text{ GHz} \leq \nu \leq 1.4 \text{ GHz}$ and $\alpha = -1.20 \pm 0.05$ for $2.5 \text{ GHz} \leq \nu \leq 14.5 \text{ GHz}$ for Cygnus A. It might be possible, however, that Cygnus has a spectral index whose absolute value increases continually with frequency. With the new absolute spectra of Cassiopeia and Taurus it becomes possible to extend the absolute spectra of a number of radio sources to about 2 cm wavelength. This is of special interest for radio sources with a positive spectral index in the microwave region. As an example, the absolute spectrum of NGC 1275 is given.

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Search for Variable Stars in Galactic Clusters. GUSTAV A. BAKOS AND KATE R. RYMER, *Dearborn Observatory*.—Recently a search for variable stars in a number of galactic clusters has been initiated at the Organ Mountain Station. A 12-in. Cassegrain telescope with an image orthicon chain attached was used to secure the photographic material for the program. With an 8 sec integration period the faintest stars recorded were of magnitude 16.5. However, due to large accidental variations of stellar images covering only one or two scan lines a reliable range of variability extends to stellar images of mag. 15.5 and brighter. The probable minimum range detected in blinking is 0.5 mag.

A total of 19 clusters have been searched. Since the photographic record covers a period of a few months, and, in some cases, only a few nights, the discovery of short-period variables would be favored. This seems to be the case for the 11 new variables found in these clusters. An eclipsing variable has been identified in NGC 1893 with a time interval between two consecutive minima of 75 min. Another variable, in NGC 2682, brightened over one magnitude in 30 min of time.

Some Remarks on the Restricted Three-Body Problem. RICHARD B. BARRAR, *System Development Corporation*.—Only in very recent times has R. F. Arenstorf [*Am. J. Math.* **85**, 27-35 (1963)] given the first rigorous proof of the existence of the periodic solutions of the so-called second kind for the restricted problem of three bodies. The purpose of the present paper is to show how Arenstorf's proof can be simplified by the use of Delaunay or Poincaré variables.

The basic ideas in the present proof are the following: the problem is first written in Delaunay variables: $L = a^3$, $G = [a(1-e^2)]^{3/2}$, l is the mean anomaly, and $g = \omega - t$ (as done by A. Wintner, *Sitzungsber. Sächsischen Akad. Wiss. Leipzig* **82**, 3, 1930) where L , G , l , g describe the orbit of the body of negligible mass and where g is a measure of the angle of pericentron from the rotating coordinates x_1 , x_2 in which the two heavier bodies are at rest.

Next it is observed that, in terms of the osculating elements l and g , the body of negligible mass crosses the x_1 axis perpendicularly whenever l and g are integer multiples of π radians.

Finally, Arenstorf's observation is recalled that if the body of negligible mass is crossing the x_1 axis perpendicularly at time $t=0$ and again at time $t=\frac{1}{2}T$, then the motion will be periodic of period T .

The perpendicular crossing and the periodicity of the orbit can be phrased in terms of l and g being integer multiples of π radians. The proof consists in showing that these conditions are ful-