elliptical galaxies have very high concentration ratios, and their central parts appear to deviate from the globular-cluster law, in the sense that the giant ellipticals have a sharper central brightness peak.

When scale factors are removed, the empirical cluster models form a one-parameter sequence, according to central concentration. Included in the sequence are systems whose age is less than one time of relaxation and others that have passed through many relaxation times. Two conclusions then appear to follow. (1) A cluster acquires its characteristic shape very soon after formation, probably in the initial mixing that establishes agreement with the virial theorem. (2) Evolution through stellar encounters moves a cluster *along* the sequence. It may therefore be suggested that the observed sequence of models is a unique sequence of states of high statistical probability. A cluster reaches the sequence quickly and then evolves along it slowly, in the direction of increasing central concentration.

Formation of Loop Prominences. JOSIP KLECZEK (introduced by H. ZIRIN), *Astronomical Institute of the Czechoslovak Academy of Sciences, Ondrejov, and The High Altitude Observatory*.—Loops, as other types of AS prominences (Menzel–Evans classification), are formed by compression and cooling from the coronal plasma. By observations we have tried to get some insight into the process of loop formation.

On May 4, 1961, a rapid formation of loops was accompanied by cosmic rays, radio emission, and later by Forbush effect. The dependence of radio intensity upon wavelength indicates synchrotron radiation of electrons in a magnetic field of several hundreds of gauss. Comparing photospheric magnetic maps of an active region and associated spectacular loops from 1957, we found that loops were anchored in large spots (Bumba and Kleczek, *Observatory* 923, 141, 1961). The loops were slightly twisted, which seemingly increased their stability. Fields of a few hundred gauss seem to exist in the highest parts of loops. Both cases indicate the importance of magnetic fields for prominence formation.

Formation of loops of May 4, 1961, was accompanied also by strong x-radiation (recorded by enhancement of atmospherics). The onset of x-radiation and radio radiation preceded by 2–4 min the moment of the appearance of loops in $H\alpha$. This indicates that the cooling preprominence plasma loses part of its energy in form of radiation.

Some loop spectra indicate a large velocity gradient in the uppermost part. Thus on May 4, 1961, the radial velocity ranged from -90 to $+170$ km/sec and on May 1, 1961, from -130 to $+130$ km/sec.

Mean Absolute Magnitude of High-Latitude Blue Stars. ARNOLD R. KLEMOLA, *Lick Observatory (now at Yale University Observatory)*.—A sample of tenth to twelfth magnitude blue stars located at high galactic latitudes has been investigated for mean absolute magnitude by means of the tau and upsilon components of the proper motions. Low-dispersion spectra, together with colors on the U, B, V system, permitted the segregation of the 205 stars into apparently homogeneous groups. For stars with low-dispersion spectra similar to normal main-sequence stars the tau component method yielded a mean absolute visual magnitude of $+2.1$ for the group B0-3 (11 stars), $+0.9$ for the group B4-7 (19 stars), $+1.5$ for the group B8-A0 (42 stars), and $+3.6$ for the group A1-5 (27 stars). The estimated uncertainty for each group is about one or two magnitudes. Other smaller groups of stars with spectra similar to hot subdwarfs, white dwarfs, and other stellar species are also recognized. The results indicate that at least those high-galactic-latitude stars of tenth to twelfth apparent magnitude with spectra like main-sequence early B stars may be largely horizontal-branch type objects.

Second-Order Solution of Artificial Satellite Theory without Air Drag. YOSHIHIDE KOZAI, *Smithsonian Astrophysical Observatory*.—Second-order periodic perturbations with third-order secular terms in motions of artificial satellites in the gravitational field of the earth without air drag are derived by von Zeipel's method.

After formal solutions have been obtained, they are modified by transforming the arguments appearing in the expressions of the first-order short-periodic perturbations from l and g to l' and g' . The final expressions of the short-periodic perturbations are given in the radius, the argument of latitude, the inclination and the longitude of the ascending node instead of in six Delaunay variables. These two modifications are introduced to minimize the number of terms whose numerical values must be evaluated to compute a position of the satellite. Some of the terms in the final expressions have very small numerical factors. Therefore, for the computation of the position of the satellite with an accuracy of $1''$, only a few terms in the second-order expressions need be evaluated.

The present expressions of the long-periodic and secular terms cannot be applied to cases of a small eccentricity and small inclination and to the case of critical inclination.

Temperatures of Dielectric Interstellar Grains. PEARL R. LICHTENSTEIN AND J. MAYO GREENBERG, *Rensselaer Polytechnic Institute*.—The degree of orientation of interstellar grains by paramagnetic relaxa-