values of the eccentricity, proportionate lengths of the semimajor axis can be approximated by the root of $n(n+1)$, for integer n . Using n as a parameter to distinguish the various branches of the discretization curves, it is found that there is a forbidden region between the branches $n=1$ and $n=2$. For the branches with $n>1$, the allowable lengths of the semimajor axis become multiple-valued for values of the eccentricity corresponding approximately to the well-known limit of 7 for the ellipticity. It is found that there are $n+1$ curves in each branch, referred to as twigs, and that each twig is associated with a circulation on the bounding surface together with a polar flow. The twigs corresponding to the ellipticals are those of vanishing polar flow but nonvanishing circulation; the twigs with nonvanishing polar flows are tentatively identified with the nonellipticals. As an immediate consequence of these results, one can obtain the true eccentricity and inclination angle of ellipticals as well as a theoretical basis for their geometric morphology.

Coronal Properties Inferred from Radio Wave Scattering Data. WM. C. ERICKSON, *University of Maryland*.—New data obtained during the occultation of Tau A by the solar corona in June 1962 are presented. The data were obtained at a wavelength of 11.4 m with the Clark Lake antenna which produces 10' wide, fan-beam scans of the apparent brightness distribution.

A compilation of many data indicate that the scattering in the corona falls as the -2.0 power of the angular separation between the source and the sun between 8 and 60 solar radii. It is shown that this is probably also indicative of the variation of coronal electron densities in this region.

The data are compared with those predicted by several idealized models of the magnetic field distribution in the corona. These comparisons show that coronal magnetic fields are fairly random in direction, but have some preference for the radial direction.

Detailed comparison between the data and the models indicates that, although most of the effects are consistent with the assumption that the radiation encounters multiple, small-angle scatterings while passing through the corona, occasional rays must suffer large-angle deviations as well.

Radiation from the Dipole Magnetic Field Model for Spiral Galaxies. HOWARD D. GREYBER, *North-eastern University*.—Current theories that attempt to explain the form of spiral galaxies may be divided into two groups: those which try to explain the spiral structure solely by ordinary dynamical

arguments, and those which invoke galactic magnetic fields together with plasma concepts. Our theory (Greyber, H. D., *Bull. Am. Phys. Soc.* 6, 285, 1961; talk to Comm. 33, "Structure du Systeme Galactique", IAU, Berkeley, August 1961; *Astron. J.* 67, 273, 1962; "On the Steady State Dynamics of Spiral Galaxies," Air Force Office of Scientific Research Rept. No. 2958) envisions a gravitationally bound current loop generating a galactic dipole magnetic field whose axis coincides with the galactic axis of rotation and whose presence in normal spirals governs the circulation patterns of the gas.

In this paper we are primarily concerned with calculating the power spectrum of the radiation expected on this model from our own galaxy and from the irregular galaxy M82. The galaxy M82 was chosen because a study of the polarization of the light from M82 gives evidence of a magnetic dipole field of galactic dimensions (Elvius, A., *Lowell Obs. Bull.* No. 119, 1963). One result of the analysis is that the current loop in M82 is apparently not gravitationally bound. However conditions in M82 are far different (Lynds, C., and Sandage, A., *Astrophys. J.* to be published) from the steady state proposed for normal spirals and this result is not surprising.

Quiet Interplanetary Magnetic Field Vector near 1 a.u. E. W. GREENSTADT, *Space Technology Laboratories*.—Unperturbed or quiet values, assumed to remain after elimination from Pioneer V's magnetic data of high readings associated with solar or geomagnetic activity, exhibit a trend over the 50-day data period (12 March–30 April 1960) which could have resulted from a changing angle between a stable ambient field and the heliocentrically rotating satellite spin vector.

The equation relating ambient $\mathbf{B}$ to spacecraft orientation geometry has been evaluated for various versions of quiet field data, and for many different combinations of measured component amplitude and known spin direction. The median solution vector is 8 gamma, it projects on the ecliptic with stream angle 9 deg (angle between ecliptic projection and radial line from sun), and, due to algebraic ambiguities, points around 14 deg either above or below the ecliptic and either toward or away from the sun. Solution extremes are: magnitude 3 to 20 gamma; stream angle, -30 to $+45$ deg; angle to ecliptic, 0 to -45 deg or $+5$ to $+50$ deg. A low yield of solutions indicates frequent departure from stability of the interplanetary field.

Although calculated stream angles are generally lower than the approximate 50° of McCracken's cosmic ray effect and of Parker's model, the solutions are reasonably consistent, within the limited