an analytical expression for the monochromatic source function.

The method is very general and can simultaneously handle both scattering and pure absorption. The method was applied to a model atmosphere for which accurate monochromatic fluxes had been computed by a conventional numerical procedure. For the monochromatic source function, we tried several analytical expressions, such as

$$S_\nu = a_0 + a_1\tau_\nu + a_2E_2(\tau_\nu) + a_3E_3(\tau_\nu). \quad (2)$$

We found that, with a suitable expression for the source function, one can obtain fluxes that are quite accurate. We tried terms like $e^{-d\tau_\nu}$ and τ_ν^m in the expression for the source function, and we needed both Φ and Λ operators of these functions in this method. Therefore, we prepared extensive tables for Φ and Λ operators of $e^{-d\tau}$ and τ^m . These tables will also be of some use in deriving nongray temperature distribution by the analytical methods (such as Swihart method) in which we represent the approximate temperature distribution by an analytical expression containing terms of the type $e^{-d\tau}$ and τ^m .

Some Studies on the Occurrence of Type IV Solar Bursts of Continuum Radiation. M. R. KUNDU, *The University of Michigan*.—It is shown that type IV emission in the range of frequencies 25–580 Mc occurs in two distinct phases: (a) the first phase, usually observed at frequencies higher than about 250 Mc, appears to be an extension of the associated centimeter-wave burst which is also a broad-band continuum emission. This emission occurs earlier than the associated type II burst and can even occur independent of any type II burst. The source of this emission is situated low in the chromosphere, has no significant movement and has a small angular size, usually less than $4'$. The observed properties of this phase of continuum emission are consistent with the suggestion that it is caused low in the chromosphere by synchrotron radiation of electrons generated during the flare. (b) The second phase, usually observed at frequencies lower than about 250 Mc, is closely associated with a type II burst preceding it. The source of this continuum emission is situated high in the corona and moves with velocities of more than 1000 km/sec. It has a large angular size, usually $10'$ or larger. This second phase of type IV emission was previously explained as due to synchrotron radiation of electrons higher in the corona, when a cloud of gas with a shock front (which excites the type II burst) moving at high velocities carries a frozen-in magnetic field to the appropriate heights in the corona.

The Calculation of Velocity from an Ephemeris.

E. R. LANCASTER, *General Electric Company, Philadelphia, Pennsylvania*.—Explicit formulas are derived which give the velocity of a body in space in terms of its coordinates in an ephemeris. For n position vectors in an ephemeris, the formulas are of order $3n-1$, whereas the customary formulas are of order $n-1$. This additional increase in accuracy is achieved by including the equations of motion. Analytical error formulas are derived. The formulas make possible a great reduction in interval size of an ephemeris.

On the Accuracy of Measurements Made upon Films Photographed by Baker-Nunn Satellite Tracking Cameras.

KAROLY LASSOVSKY, *Smithsonian Astrophysical Observatory*.—The photographs taken by the Baker-Nunn cameras of the Smithsonian Astrophysical Observatory were formerly measured with Van Biesbroeck goniometers, but are now measured exclusively with Mann two-screw comparators. Instead of measuring point images, we usually have to measure oblong images, either trails or breaks (the latter produced by interruption of the exposure). We can therefore expect that the accuracy of the determination of their positions is more influenced by the personal errors than it is in conventional astrometry. Approximately 800 measurements were made on 34 images of different length, and from these the frequency distribution of settings was determined. Then the relationship between this distribution and the length of the image (trail or break) was examined, and the relationship between the "magnitude error" and the length of image was determined. Measurements were made at different angles formed by the trails and the reticle lines, and it was found that the accuracy was not affected by the angle of the setting. Position determinations have been made using reference stars at different distances. On the basis of these results we can conclude that the accuracy is neither influenced by the distortion of the emulsion nor by the optical distortion within an area of a diameter of 5 cm ($5^\circ.8$). We believe that we are justified in using the linear plate-constant method, at least within this area. From numerous double and multiple measurements the following standard errors were determined for a single position:

	μ_α	μ_δ	μ_D	n
Van Biesbroeck	$4''.0$	$3''.2$	$5''.7$	54
Mann	1.1	1.1	1.7	136.

A Remark on Observational Cosmology.

DAVID LAYZER, *Harvard College Observatory*.—Consider a spherical galaxy cluster of radius r and mean density ρ distant R from the sun. If the cluster is in a steady state and v denotes the velocity of a galaxy relative