observed. More than half the line absorption in the near ultraviolet and violet spectra of these stars is caused by lines that lie on the "flat" part of the curve of growth and that are very insensitive to *small* changes in abundance. However, the strengths of these saturated lines are directly proportional to the velocity parameter. In fact, the color anomalies observed among most solar-type stars appear to arise primarily from differences in turbulence. The correlations among line strengths, kinematics, and age imply that turbulence decays with age. High turbulence is responsible for a large part of the *photometric* anomalies that distinguish many metallic-line stars. In these objects, however, duplicity also plays an important role in perturbing the photometric indices and in making them unreliable indicators of metallicism.

Balloon-Top Collections of Particles from Meteor Showers. R. COON, J. DUGAN, D. HALLGREN, AND C. HEMENWAY, *Dudley Observatory and the State University of New York, Albany*.—A balloon-top micrometeorite collector has been used to sample particles from the Geminid, Zeta Perseid and Arietid and the Perseid meteor showers. The flux values for particles larger than 5μ in diameter collected during shower periods and also at times in the absence of showers are shown in Table I.

TABLE I

Type of flight	Flight date	Flux of particles greater than 5μ (part/m ² /sec)
Control	Nov. 8, 1963	$\sim 2 \times 10^{-2}$
Geminid	Dec. 15, 1963	18×10^{-2}
Zeta Perseid- Arietid	June 10, 1964	30×10^{-2}
Perseid	Aug. 12, 1964	160×10^{-2}
Control	Nov. 9, 1964	$\sim 4 \times 10^{-2}$
Geminid	Dec. 14, 1964	23×10^{-2}

The balloon flights were made, when possible, approximately two days after the shower peaks to allow time for the particles to reach the balloon collection altitudes which ranged from 95 to 115 thousand feet. Almost all of the observed particles are irregular and few spherical particles have been found.

The flux values obtained are consistent with the micrometeorite microphone data obtained from orbiting satellites and from rocket collections of smaller particles. These results imply that only a small fraction of the dust particles entering the earth's atmosphere are in satellite orbits and that the earth's capture cross section for dust particles is significantly greater than the earth's geometric cross section.

On the Information Contained in Center-to-Limb Observations. CHARLES COWLEY, *Yerkes Observatory*.—Several years ago Karl-Heinz Böhm published a note in the *Astrophysical Journal* (134, 264, 1961). The conclusions of this note were that center-to-limb observations at a given wavelength were unable to provide more information than is contained in a three-parameter formula for the source function in a stellar atmosphere.

This analysis was based on an analogy between the limb-darkening equation, which may be expressed as a convolution, and ordinary distortion-rectification problems. Fourier techniques were employed. The analogy, however, is not sufficiently close. In the case of the distortion of a true line profile $t(x)$ by an apparatus function $a(x)$ to give an observed profile $o(x)$, the functions $t(x)$, $a(x)$, and $o(x)$ are transient functions whose Fourier transforms are well defined. The limb-darkening equation for $I(\cos \theta)$ however, is only defined for values of $\cos \theta$ equal to or less than one, and greater than some limiting value at which the assumption of plane-parallel layers is no longer valid. $I(\cos \theta)$ thus does not have a Fourier transform.

Use was also made of the "sampling theorem" from information theory. However, in the application of this theorem the *observable range* of a function was confused with the *range over which a function is finite*. The sampling theorem deals with the latter quantity, while in limb-darkening problems we are concerned with the former, namely the observable range of $I(\cos \theta)$.

We conclude that there is no reason to suppose that improved limb-darkening observations will not require a four-, or perhaps even a five-parameter formula for their description. The three-parameter formulas that have been used in the past are plainly inadequate to describe *both* the rapid decrease of the source function toward small optical depths and the departures from linearity that occur near optical depth unity.

Photoelectric H β Photometry for B Stars in the Orion Belt Region. D. L. CRAWFORD, *Kitt Peak National Observatory*.—The parameter β , which measures empirically the H β absorption strength in a star spectrum, has been obtained for 93 stars in the "belt region" of Orion. On the basis of β and $(U-B)_0$, the ultraviolet color index of the *UBV* system corrected for interstellar reddening, almost all these stars prove to be of nearly the same age and hence probably have absolute magnitudes nearly the same as for equivalent stars in the Scorpio-Centaurus group. The ambiguity discussed by Hardie, Heiser, and Tolbert (*Astrophys. J.* 140,