dened $U-B$ color at secondary minimum resembles that of an early A type supergiant and the unreddened $B-V$ color at primary minimum is similar to that of a late G or K0 star of class III or IV. Thus, we find an ultraviolet excess of about 0.3 at totality. The ultraviolet excess may be the same effect recently reported by Popper and Walker (*Astron. J.* 68, 543, 1963) for some similar eclipsing systems.

Solar Observations at 3.2 mm Wavelength.

MICHAEL SIMON (introduced by T. GOLD), *Cornell University*.—We discuss the extensive observations of the sun at 3.2 mm wavelength carried out during the summer of 1964 with a radio telescope of 3 min of arc beamwidth. The work was done in El Segundo, California using the telescope of the Aerospace Corporation. Brightness temperature maps were made and are correlated with H_α photographs and magnetograms. Regions of enhanced 3.2 mm emission are shown to correlate well with H_α active regions and regions of strong magnetic fields. Particularly high enhancements were observed in regions that later flared. One flare was observed but not from its beginning. No bursts were detected. No consistent limb brightening was observed. By statistical analysis of the observations, Stacey of the Aerospace Corporation found the average brightness temperature of the center of the solar disc to be 6402 ± 215 °K. (The uncertainty refers to statistical and *not* to systematic errors.)

Metal Abundance Determinations for Vega and Sirius. S. E. STROM, OWEN GINGERICH, AND K. M. STROM, *Smithsonian Astrophysical Observatory and Harvard College Observatory*.—Some recent model atmosphere work done by the authors (Strom, S. E. and Avrett, E. H., *Ann. Astrophys.*, in press) suggested that the anomalously small Balmer discontinuity observed in Sirius might be due to an increase in continuous metal opacities arising from a high abundance of metals, particularly Mg and Si. This hypothesis provided the motivation behind the two abundance analyses reported here.

For these analyses a standard grid of nine, non-gray stellar models was constructed for the effective temperature range $9000 < T_{\text{eff}} < 10\,000$ °K and from 3.7 to 4.3 in $\log g$. This range of effective temperatures and surface gravities is representative of the values either known directly or deduced from comparison between stellar models and observations of hydrogen line profiles and continuous fluxes for Vega and Sirius.

In addition we have constructed a set of models at $T_{\text{eff}} = 9500$ ° with a $\log H/\text{metals}$ of approximately

4, 3, and 2. The equivalent widths of several representative metal lines were calculated from those models and the results are compared with the observed equivalent widths.

The abundances we have obtained are as follows:

Element	Log A		GMA Log A
	α Lyr	α CMa	
Na I	...	-5.70	-5.70
Mg I	-4.50	-4.50	-4.60
Al II	...	-4.70	-5.80
Si II	-4.50	-3.50	-4.50
Ca I	...	-6.00	-5.85
Sc II	-9.00	-10.0	-9.18
Ti I	...	-5.75	-7.32
Ti II	-7.20	-6.25	...
Cr I	-6.70	-6.25	-6.64
Cr II	-7.00	-6.5	...
Mn I	-6.2	-6.2	-7.10
Fe I	-5.4	-5.0	-5.43

However, estimates of microturbulent velocities in the atmospheres of both stars are critical in these abundance determinations, particularly since most of the Mg and Si lines observed fall on the flat portion of the curve of growth. Further observations will be necessary to determine these microturbulent velocities.

The Standard Model in General Relativity.

ROBERT F. TOOPER (introduced by S. Chandrasekhar), *IIT Research Institute, Chicago, Illinois*.—Calculations were made of the structure of extremely massive stars in general relativity, assuming the ratio of gas pressure to total pressure to be constant throughout the star. The ideal-gas equation of state was assumed to hold for matter in the star. A pair of coupled first-order nonlinear differential equations was obtained which generalizes the Lane-Emden equation of index 3 to relativistic pressures and densities. These equations were solved numerically using the Runge-Kutta method on an IBM 7090 computer. The masses and radii of the configurations are shown as functions of $\log_{10} \alpha$ and $\log_{10} \beta$, where α is the ratio of total pressure to rest energy density at the center and β is the ratio of gas pressure to total pressure. The stability of each configuration was determined using the variational principle found by Chandrasekhar (*Astrophys. J.* 140, 417, 1964). In contrast to the corresponding Newtonian case, in which even large masses are in stable equilibrium as the adiabatic exponent Γ_1 approaches the limiting value 4/3 from above, in general relativity there exists a set of configurations which are unstable with respect to radial perturbations. Instability sets in at a radius much larger than the gravitational radius