and essentially independent of height. Typical computed values are $b_{31S} \approx 25$ at 6000° and ≈ 200 at 8000° .

The departures from LTE in the higher triplet levels are also relatively independent of height. Typical values are $b_{41S} \approx 1.4$ at 6000° and ≈ 3.3 at 8000° . For the upper level of $\lambda 5528$, 4^1d , the departure from LTE depends strongly on height thereby accounting for the steep gradient in the $\lambda 5528$ emission.

The Measurement of Microwave Radiation from the Planet Mercury. WILLIAM E. HOWARD, III, ALAN H. BARRETT, and FRED T. HADDOCK, *The Observatory of The University of Michigan, Ann Arbor, Michigan*.—Forty-nine drift curves and eight on-off measurements on Mercury were obtained during 1960–1961 near elongation with an 85-foot telescope at 3.75 cm (TWT radiometer) and 3.45 cm (maser radiometer).

The mean antenna temperature of the 49 drift curves was 0.05 ± 0.01 °K (before amplitude correction for time constant) or five times the rms noise level. The mean drift curve had a response width and a response delay in the peak which were in excellent agreement with the expected values.

During these measurements Mercury was between 19 and 28 deg from the sun. Since the undisturbed sun produces a flux density three million times that of Mercury, output variations might be caused by variations in either solar flux or side-lobe levels. Comparison of solar and Mercury records exclude deflections from solar bursts. Side-lobe variations are reduced because of the appreciable smearing of the lobe positions by the receiver bandwidth and the effect of averaging 49 drift curves at different angular distances from the sun.

If we assume that only thermal radiation is present, the subsolar point temperature T_0 , reduced to Mercury's mean solar distance, is estimated from the equivalent blackbody temperature of about 350 °K by multiplying it by (1) $(r/r_0)^{1/2}$, the reduction to mean distance, and (2) a factor which depends on both the planetocentric angle between the sun and the earth and the temperature distribution on the sunlit planetary surface. Assuming that the latter varies as $T_0 \cos^{1/2} \theta$, where θ is the angle of incidence of solar radiation on the surface and that the radiation from the dark hemisphere is negligible, then we derive $T_0 = 1050 \pm 350$ °K. This assumes that the flux density of Cygnus A is 162×10^{-26} mks units. If the sunlit surface temperature is uniform, then T_0 should be reduced by about 30%.

The subsolar point temperature of 1050 ± 350 °K is to be compared with the value of 610 °K derived by Pettit and Nicholson from vacuum thermocouple observations in the infrared.

Study of Infrared Instrumentation for Thermal Photography of the Moon. HECTOR C. INGRAO, DONALD H. MENZEL, and J. ANTHONY BURKE, *Harvard College Observatory*.—Successful thermal photography, for the primary purpose of temperature measurement, depends on the value of the signal intensity at the ground, or in a balloon or space vehicle. Computations predict the image temperature, for an image-forming system with a single thermal detector having a sequential readin and readout.

Thermal detectors and available single-quantum detectors with responses at wavelengths of approximately 5μ and longer are intercompared in terms of figures of merit.

Infrared sensitive image-forming systems are surveyed and discussed for lunar thermal photography. Lateral heat conduction in the target plate of a simultaneous readin image-forming system is analyzed to determine the size of the minimum resolvable element. On the basis of this analysis, we investigated the possible utility of new thermal detectors as target plates for image-forming systems of simultaneous readin.

The potentialities of ferroelectric materials for a target plate (thin film) of an image-forming system depend on the change in dielectric constant as a function of temperature close to the Curie point. In particular, measurement of the dielectric constants of thin films of $(\text{Sr-Ba})\text{TiO}_3$ will enable the determination of temperatures to 10^{-7} °C. This corresponds to detecting an irradiance of approximately 10^{-10} w per resolution element for a film 100μ thick.

Nonlinear phosphors, especially zinc cadmium sulfide, are considered for thermal image conversion. This phosphor fluoresces in the yellow and has a brightness change of approximately 28% deg centigrade for a given ultraviolet excitation, and phosphor temperature.

Radio Observations of Solar Active Regions at cm-dm Wavelengths. T. KAKINUMA, *Radio Astronomy Institute, Stanford University*.—Comparison has been made of the observations of the slowly varying component of solar radio emission made with high-resolution interferometers operating at wavelengths of 3.2, 7.5, 9.1, and 21 cm, and located at Nagoya, Stanford, and Sydney. The interferometers provided fan-shaped and pencil-shaped beams of about 2 to 3 minutes of arc.

The slowly varying component is radiated from hot and dense regions situated above the sunspot regions. Ten strong isolated regions observed during 1960 were selected for the present study. The area of the associated sunspot group varied from about 500 to 2000 millionths of visible hemisphere. At