the temperature of the moon was 256°K ; at 1300 Mc the temperature of the moon was 254°K .

Further data were gathered for half a lunation between first and third quarter of lunar phase. With the same accuracies quoted above no change in temperature at 3000 Mc was measured during this series of observations. Additional data will be taken at 3000 Mc to determine the variability of lunar temperatures over several lunations.

Surface and Brightness Temperatures from the Central Intensities of the Balmer Lines. GUISA CAYREL, *Mt. Wilson and Palomar Observatories* (introduced by JESSE L. GREENSTEIN).—According to the local thermodynamic equilibrium picture, the pseudocontinuum formed by the central intensities of strong saturated lines (the first Balmer lines, for instance) is given by the energy distribution of a blackbody at the surface temperature T_0 .

Surface temperatures have been derived by this method for 33 stars. They are in reasonable agreement between spectral type B5–F8 with expected surface temperatures from model atmospheres.

Using a few eclipsing variables we have checked this method and derived the radii of these variables when their parallaxes are known. We have calculated also the limb-darkening constants of the 33 stars.

Model Atmospheres and Conventional Curve of Growth Analysis. ROGER CAYREL, *Mount Wilson and Palomar Observatories* (introduced by JESSE L. GREENSTEIN).—Possible systematic differences between abundances derived from the conventional curve of growth analysis and from detailed model atmosphere computations have been investigated. They have been found to be small, usually less than the sum of the errors arising from observational inaccuracy and incorrect assumptions in the theory.

The main advantage of using models seems, therefore, to be confined to the use of more observational data to determine the physical parameters, temperature and gravity. Color, Balmer jump, and profiles of the Balmer lines are such examples. In addition, the use of models removes the uncertainty in the connection between the excitation and ionization temperatures.

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Harvard 21-Cm Maser Observations of Galaxies. B. F. C. COOPER, E. E. EPSTEIN, S. J. GOLDSTEIN, JR., J. V. JELLEY, AND M. A. KAFTAN-KASSIM, *Harvard College Observatory*.—A three-level solid-state ruby maser has been installed on the 60-foot Harvard radio telescope. The maser was constructed primarily for a study of the 21-cm hydrogen-line radiation. The sensitivity of the maser has permitted

a study of galaxies which are relatively nearby in space.

The maser radiometer is a switched or Dicke type that measures the difference in total power available from the antenna and a reference load. In this case, the reference load is maintained at liquid-helium temperature. The antenna and reference-load temperatures can be balanced by adding noise to the reference load from an argon noise source. The maser radiometer is balanced at the beginning of each observation in order to minimize the effects of radiometer gain changes.

The total noise temperature of the radiometer is approximately 100°K , made up of 70°K because of ohmic losses in the switch, circulator, and coaxial cables, 20°K because of the side lobes of the antenna, and 10°K because of the remainder of the receiver. The input switch is a Y-type circulator with a reversible magnetic field; the phase-sensitive detector uses a relay with gold-plated contacts. Both the switch and the detector operate at 3.5 cycles/second. The radiometer bandwidth is 1 Mc for continuum observations and 200 kc for observations on the line; the integration time is 50 sec, and the antenna beamwidth is 55 minutes of arc.

Each of the observations is a drift curve, half an hour long for sources near the celestial equator and longer at higher declinations. For each source, a minimum of three reliable drift curves were obtained at a frequency corresponding to the uncorrected redshift given by Humason, Mayall, and Sandage. A minimum of three drift curves were obtained at a frequency substantially removed from the redshift frequency.

Three of the galaxies observed by the Leiden group, NGC 3031, 4258, and 6822, are alike in that their redshifts are within the range of velocities of hydrogen in our own galaxy. Detectable signals for each of these sources exist at the optical position and velocity. However, only in the case of NGC 6822 does the radiation have a small enough angular size to make it certain that the external galaxy is the source. Confirmation of Leiden observations on NGC 5194, 5457, and 6822 was obtained.

Hydrogen emission from NGC 2403, 4214, 4631, 5236, and IC 10 has been observed. Continuum emission has also been detected for NGC 5236.

The galaxies in our list not previously observed were selected on the basis of large angular size in the Shapley-Ames catalogue or from the presence of emission regions reported by Humason, Mayall, and Sandage. This program is continuing and is supported by the National Science Foundation.

A Method of Computing Stellar Interior Models. A. N. COX, D. L. BOWERS, AND R. R. BROWNLEE, *Los Alamos Scientific Laboratory, Los Alamos,*