sions of 38 and 88 Å/mm with the spectrograph at the 36-in. refractor in order to search for the $\lambda 6707$ line of Li. High-dispersion spectra—4, 8, and 16 Å/mm—of nearly 60 of these stars were obtained with the coude spectrograph of the 120-in. reflector.

An abundance analysis was carried out using the curve of growth technique. A differential analysis was made beginning with late K stars where the continuum can be quite accurately positioned and the atmospheric parameters well determined. Then the curves of growth of successively cooler stars were compared with the preceding ones. At the temperatures and pressures for most of these stars, Rayleigh scattering was found to be some 50–100 times less important than H^- as a source of opacity in the wavelength region of this study.

The range of the abundance ratio of Li/Ca has been found to extend from more than two orders of magnitude greater than this abundance ratio in the sun to upper limits much less than the solar value. In some of the stars the abundance of Li is so high that the Li feature at $\lambda 6104$ is clearly visible on the 4 Å/mm spectrograms. Correlations of Li/Ca with other properties of the stars are discussed.

Observations of the Hydrogen Recombination Line $n_{110}-n_{109}$ Emitted from Galactic H II Regions. P. G. MEZGER, *National Radio Astronomy Observatory*.—Following the detection of the hydrogen recombination line $n_{110}-n_{109}$ at 5009 MHz (Höglund and Mezger, *Science* **150**, 339, 1965), we have investigated the line emission of about 20 galactic radio sources (Höglund and Mezger, to be published) and have mapped their continuum radiation at the same frequency (Mezger and Henderson, to be published). The line observations yield: Identification of radio sources as thermal or nonthermal radio sources. The radial velocities of H II regions, from which their kinematic distances can be determined. The ratio of the brightness temperatures of line to free-free emission, from which the electron temperature can be determined. The line Doppler width, from which the rms velocity of the internal turbulence of the H II regions can be determined.

The continuum mapping of the investigated sources yield source positions with accuracies between 1 and 3 min of arc. Only four out of 20 investigated galactic sources were not resolved in two or more components. Combining the flux densities of the observed source components with their kinematic distance we have computed the average electron density and the total mass of ionized hydrogen. The following results were obtained: The rms velocity of the peculiar motion of H II regions seems to be in the order of 6 to 9 km/sec. The electron temperature of the investigated H II regions is in the order of 5000°K, the rms velocity of their internal turbulence ranges between

8 and 28 km/sec. The average electron densities lie between 1600 and 85 per cm^3 .

The rms velocity dispersion between the radial velocities of OH emission lines and nearby H II regions is about 6 km/sec, supporting hence the hypothesis that the OH line is emitted from clouds which are close to H II regions.

Reduced Lunar Equatorial Principal Inertia Moment Difference Related to Inclination Angles.

IRVING MICHELSON, *Illinois Institute of Technology*.

—Estimates of the mechanical ellipticity of the lunar equator furnished by the theory of the moon's physical librations in longitude have been subject to considerable revision and great uncertainty. In the past 150 yr accepted values of this quantity have been reduced in stages by roughly one full order of magnitude, while uncertainty limits are now taken as about 50% of the value itself. The greater values obtained from early observations, and now largely discredited, presupposed libration amplitudes that are now also regarded as excessive. Inconsistency with values deduced from liquid ellipsoid potentials induced Laplace to conclude that the moon could not have been primitively fluid.

When physical librations are analyzed by admitting the possibility of such small libration amplitudes as now seem probable, the sun's importance in determining lunar rotational motion is much enhanced. In addition to providing an improved physical basis for Cassini's laws, it is shown that the equatorial principal-moment difference does not require the separate treatment that it has customarily received. Both the largest (polar) difference and the equatorial difference are seen to be expressible in terms of the inclination angles of the moon's orbit and its equator, without reference to inequalities of orbital motion and related observations of doubtful accuracy used in the past. Short-period data from moon-based reflectors can be expected to facilitate greatly improved estimates of the constants of physical libration.

Galaxy Formation: Angular Momentum Problems in the Fragmentation Process.

RICHARD W. MICHIE, *Kitt Peak National Observatory*.—A full dynamic theory of fragmentation must take into account the mutual interaction of the fragments, and to study this interaction it is convenient to consider separately the acquirement of energy and angular momentum.

Any given fragment experiences torques caused by the tidal forces arising from the presence of the other fragments. A net torque will arise only if there is an asymmetry in the geometry of the fragment and also an asymmetry in the space and velocity distribution of the other fragments. A statistical expression is