stars in the SMC listed in the Henry Draper catalogue, two spectra of the highest dispersion available at the Newtonian focus of the 74-inch telescope (90 Å/mm at $H\gamma$) were studied in detail. Four-hour exposures were required to maintain homogeneous photographic density with maximum resolution (projected slitwidth 18μ), uniform widening to 0.4 mm, similar to plates of brighter stars in the Galaxy which have already been classified on the MK system.

Equivalent widths have been measured for about 10 lines in the violet, which show good agreement with galactic supergiants of luminosity class Ia and corresponding spectral types. Typical values for the Balmer lines range from 0.6 to 1.8 Å, and for well-resolved helium lines from 0.2 to 0.7 Å.

The stellar radial velocities, with excellent internal consistency, follow closely the results of 21-cm observations of the adjacent neutral hydrogen in the Small Cloud. HD 5713 and 7222 are foreground main-sequence stars in the Galaxy. Single spectra of two emission nebulae in the Cloud were obtained.

Evidence of Isostasy and Differentiation on the Moon. WINIFRED SAWTELL CAMERON and JOHN A. O'KEEFE, *Theoretical Division, Goddard Space Flight Center, National Aeronautics and Space Administration*.—All maps of the moon show that the maria are lower than the surrounding highlands, hence the pressures immediately below the surfaces of the maria are less than those beneath nearby continents. Hydrostatic forces, which tend to lift the maria surfaces, might in principle be resisted either by mere mechanical strength, or by greater weight in the material underlying the maria, which would bring about hydrostatic equilibrium at a depth of a few tens of kilometers as on earth. A decision between these two hypotheses is possible in virtue of the presence of half-drowned, inward-tilted craters around many maria. These indicate that the maria sank (presumably under the additional load of the mare material) even though they were already below the average level. If the maria floors are kept down by mechanical strength, they should tend to *rise*, even after the addition of new material. The tendency to sink means that they already had denser material at depth. A particularly clear case of sinking is furnished by the region of the Straight Wall.

On the assumption that tektites come from the moon, the outer layers must be of a more acid composition than heretofore considered. A granitic crust implies differentiation which, on earth, is accomplished by predominantly acidic igneous activity. The extreme flatness, radar 10 cm smoothness, feather edges, and ghost craters of the maria can be explained by ash flows such as come from highly acid volcanoes; certain rugged mountains,

e.g., Piton, can be explained by emission of very viscous acidic lavas.

The constitution here suggested for the lunar maria is similar to that of a terrestrial ocean, namely, a basaltic substratum, covered by a few kilometers of acid volcanic ash flows, analogous to the submarine turbidity flows which produce the graywackes.

Model for Pre-Supernova Stars. H. Y. CHIU, *Institute for Space Studies, and Laboratory of Nuclear Studies, Cornell University* (National Academy of Sciences and National Research Council NASA Research Associate).—When the internal temperature of a star exceeds 10^9 °K the evolution is very rapid (H. Y. Chiu and P. Morrison, *Phys. Rev. Letters* **5**, 573, 1960). The time scale is around 3000 years. Energy dissipated by emission of neutrinos is several orders of magnitude higher than that by optical radiation. Neutrinos have exceedingly long mean free path ($\sim 10^{20}$ g/cm²) and they will escape as soon as they are produced. The star will contract to release gravitational energy to make up the energy lost to neutrinos and the internal temperature will rise to comply with the virial theorem. It is possible in this fast evolutionary phase to neglect optical radiations altogether as compared with the neutrino radiation. Then the equations of the core are much simplified. A simple model has been constructed and analytical solutions obtained. The resulting star becomes a supernova via the iron-helium transition mechanism as suggested by Burbidge *et al.* (Burbidge, E. M., Burbidge, G. R., Fowler, W. A., and Hoyle, F., *Revs. Modern Phys.* **29**, 547, 1957). The model consists of a perfect gas sphere and a neutrino energy loss function of the type $dU/dt = -U_0T$ (in ergs/g-sec), where U is the internal energy per gram of matter and U_0 is a constant; T is the temperature. Initially the star has the structure of a polytropic gas sphere of index 1.5. The star evolves into a supernova via homologous transformations. This property is a result of our simplified neutrino energy loss function, and is not likely possessed by the actual star. The general case will be studied on a computer.

The Dynamics of Supernova Explosions, STIRLING A. COLGATE, WILLIAM H. GRASBERGER, and RICHARD H. WHITE, *University of California*.—We have calculated the dynamical implosion of a supernova star $10 M_\odot$ using an equation of state that includes the thermal decomposition of iron to helium (Burbidge, E. M., Burbidge, G. R., Fowler, W. A., and Hoyle, F., *Revs. Modern Phys.* **29**, 547, 1957) and helium to neutrons and protons. Starting from an initial equilibrium star of a polytrope of index 3, a mock-quasistatic evolution