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Sodium and Potassium in the Lunar Atmosphere A.E. Potter
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The discovery that sodium and potassium vapor can be observed in the lunar atmosphere using ground-based telescopes has opened up a field of investigation that was closed after the last Apollo mission to the Moon. The Apollo measurements showed that the Moon does have a detectable atmosphere, but left a number of questions unanswered. During the Apollo missions, surface measurements were possible only during nighttime when outgassing from the nearby manned vehicle was negligible. Orbital measurements using spectroscopy gave negative results, apparently because the spectral range of the instrument was not wide enough to include all possible species in the atmosphere. The ground-based measurements of sodium and potassium vapor show that the lunar atmosphere extends to great heights. Sodium has been detected at altitudes up to 1500 km above the surface. This implies a high effective temperature for the sodium, of the order of 1000° K. However, there is some evidence for two populations of sodium and potassium, one at temperatures corresponding to the surface, and another corresponding to high temperatures, as quoted above. The sources for the lunar atmosphere are not understood. Meteoric bombardment of the surface, solar wind sputtering of the surface, and photo-sputtering of the surface have all been suggested as possible sources for the lunar atmosphere. One of the objectives of current research is to test different hypotheses by measurements of the atmosphere under different conditions of solar illumination and shielding from the solar wind by the earth.