

Stellar Physics.—A study of the physical characteristics of the sun and other heavenly bodies, including certain aspects of the earth itself, forms part of the astronomical program of the Dominion Observatory. The spectrum of the sun is studied by photographic means as well as by the use of photoelectric and photoconductive cells. These spectroscopic studies also give a considerable amount of information about the gaseous constituents of the earth's atmosphere through which the sun's radiation must pass. Additional information concerning the sun is obtained by means of frequent direct photographs through a red filter which admits only the light from its hydrogen atmosphere. These atmospheric photographs are especially valuable for the study of eruptions and variations in the sun's surface of a kind which may affect conditions on the earth.

Still another important means of studying the sun's atmosphere is by the observation of solar eclipses, rare events frequently interfered with by clouds. During an eclipse on June 30, 1954 spectroscopic studies of the sun's atmosphere were made by the Observatory with spectrographs mounted in an aircraft at a height of 27,000 feet. The effects of clouds were thus avoided and excellent spectra were obtained of that part of the sun's atmosphere projecting beyond the obscuring moon. These studies of the sun give a clearer understanding of its atmosphere and the source and characteristics of its radiation. Of particular interest are those changes, usually associated with sunspots, which cause auroras, magnetic storms, radio fadeouts and other disturbances in the earth's upper atmosphere.

In the field of meteoric astronomy, investigations of the motions of meteors or shooting stars give very valuable information concerning the upper atmosphere of the earth. In addition one of the major problems of astronomy is concerned with the origin and the relation to other members of the solar system of bodies that enter the earth's atmosphere to form bright meteors and if sufficiently massive, occasionally fall to the earth's surface. Regular visual observations of meteors together with direct photographic and spectroscopic observations are carried on at Ottawa. At Meanook and Newbrook, Alta., two powerful astronomical cameras of the Schmidt type, set up 26 miles apart, are employed in the photographic triangulations of meteors. Measurements of the photographs, establishing the exact position and space velocity of the meteors and the deceleration produced by the earth's atmosphere, have an important application to problems of the ballistics of high velocity military projectiles in the upper atmosphere.

Another problem of meteoric astronomy is the character and origin of meteorite craters and their possible relationship to similar craters on the moon. Several Canadian craters are being actively investigated and one has been found which appears to be 400,000,000 years old. A mathematical investigation has been initiated aimed at making clear the character of the explosive forces generated when a meteorite of very large size strikes the earth and some progress has been made in explaining the shapes and dimensions of known terrestrial craters.

THE DOMINION ASTROPHYSICAL OBSERVATORY*

The function of the Dominion Astrophysical Observatory at Vancouver is to make and interpret observations of the stars and other celestial objects in order to contribute to the exploration of the dynamical and spatial nature of the universe, to determine the dimensions of the stars, and to elucidate their physical and chemical conditions and the amount and quality of their radiant energy. For these purposes observations are made with a powerful spectrograph attached to the 72 inch telescope. The starlight is analysed and photographed in the spectrograph so that measurements can be made of the complex radiations emitted by the stars. Another instrument, the photoelectric photometer, enables precise measurement to be made of the brightness of starlight in half a dozen colours.

Broadly speaking the work falls into two branches. To study the universe large numbers of stars are photographed and their speeds, luminosities and distribution in space measured. On the other hand studies of the nature of the stars as physical entities are carried out by making detailed analyses of the photographed spectra of a relatively small number of selected stars.

* A more detailed account is given in a special article appearing in the 1948-49 Year Book, pp. 63-71.