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## ON THE RELATIONS OF STELLAR ELECTRICITY AND MAGNETISM TO THE PHENOMENA OF THE SUN'S ATMOSPHERE<sup>1</sup>

By Dr. ROSS GUNN

NAVAL RESEARCH LABORATORY, WASHINGTON, D. C.

NEARLY twenty years ago Hale and his collaborators at the Mt. Wilson Observatory established the existence of a general solar magnetic field. Measurements of the Zeeman displacement of certain spectroscopic lines showed that the solar magnetic field is quite large and that the sign and distribution of the field at given levels were strikingly similar to that of the earth. An unexpected anomaly was found, however, in the very rapid radial decrease of the magnetic field, which dropped from 55 gauss at an altitude of 250 km to about 10 gauss at 450 km. The observed data are consistent with the conclusion that the sun

is a uniformly magnetized sphere whose axis is tipped about 6° to the axis of spin and completely surrounded by an atmosphere which somehow limits the external magnetic field by systems of electric currents. Fig. 1 illustrates in a rough manner the presumed distribution of the magnetic field within and around the sun, while Fig. 2 gives the observed magnetic field intensities in the sun's atmosphere as a function of the altitude above the photosphere.

It is well established that the pressure in the solar atmosphere, at levels that may be observed, is well below one one-hundredth of an atmosphere and that the molecules are nearly all ionized. That is to say, the solar atmosphere is a rarefied ionic gas with an

<sup>1</sup> An address delivered before the Section of Astronomy, American Association for the Advancement of Science, Syracuse, New York, on June 21, 1932.

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