bilities for investigation in these regions. The device also allows a number of other interesting applications, such as the amplification of the light intensity of the image over its original value, the electrical magnification of the size of the image, and various new combinations with regular optical devices.

38. New Experiments on Bitter's Powder Patterns. K. J. SIXTUS, *Research Laboratory, General Electric Co., Schenectady, N. Y.*—On six single crystals of silicon-iron (3.5 percent Si) the properties of the powder patterns first observed by F. Bitter (Phys. Rev. **38**, 1903 (1931) and **41**, 507 (1932)) have been studied. Three different types of pattern can be distinguished: I, on the straight part of the magnetization curve at low fields, II, from the knee of the magnetization curve nearly up to saturation, III, near to and at saturation. I consists of rather broad lines which lie in the direction of intersects between (100) crystal-planes and the sample surface, II of very distinct lines, multiplying as the field is increased and parallel to intersects between (110) planes with the surface, III of broad bands in general perpendicular to the applied field. The different directions of the patterns can be explained by the present theory of the magnetization process, while for the understanding of other properties, particularly the line spacing (about 10^{-2} cm) and its field dependence, a hypothesis is suggested.

39. The Vapor Pressure of Deuterium. F. G. BRICKWEDDE, R. B. SCOTT, HAROLD C. UREY AND M. H. WAHL. *The Bureau of Standards, Washington, D. C. and Columbia University, New York, N. Y.*—The vapor pressure of a sample of deuterium, Hd_2, of nearly 100 percent purity, was measured with a mercury filled manometer connected to a bulb containing liquid or solid deuterium. The bulb of the manometer was immersed in a liquid or solid hydrogen cryostat connected with a vacuum pump for temperature regulation. Temperatures were determined with a vapor pressure thermometer filled with ordinary hydrogen. The results are as follows:

Temperature	*V.P. of Hp_2*	*V.P. of Hd_2*
14.0°K (Triple pt. of Hp_2)	5.4 cm of Hg	0.5_8 cm of Hg
$18._7$° (Triple pt. of Hd_2)	$45._5$	13.
20.4° (Boiling pt. of Hp_2)	76.0	25.

Preliminary results show that the ratio of the heats of vaporization, sublimation and fusion are: 1.25, 1.46, and 1.6 respectively, the values for deuterium being larger in each case. Also, the difference in vapor pressures is larger than expected from the theory given by Urey, Brickwedde and Murphy (Phys. Rev. **40**, 1 (1932)). Additional measurements are being made with another sample of deuterium prepared from water further electrolyzed beyond that from which the above sample was prepared.

40. Raman Spectrum of Heavy Water. R. W. WOOD, *The Johns Hopkins University.* Raman spectra of 18 and 80 percent heavy water have been obtained by Hg 2536 excitation. H^2OH^2 gives a Raman band of much shorter wave-length than ordinary water. H^2OH^1 gives two bands, one nearly but not quite in coincidence with the bank just mentioned and another nearly in coincidence with the band of ordinary water. Heavy water vapor should show two double lines corresponding to the partially superposed bands.

41. Small Angle Scattering of Potassium Atoms. W. H. MAIS AND I. I. RABI, *Columbia University.*—A narrow beam of neutral potassium atoms was scattered by six different gases. The scattering was investigated by means of a surface-ionization detector. The detecting filament subtended an angle of approximately 4′. From the ratio $I/I_0 = e^{-d/\lambda}$ one can calculate by a method analogous to Tait's an effective collision radius for scattering greater than 4′. If we include in I all potassium atoms which are scattered less than 1° we obtain another set of collision radii. These two sets of values are presented in the table together with the σ_{12} obtained by using 3A for the radius of the potassium atom and the kinetic theory radii for the gases. If we are to take account of the quantum theory scattering of hard spheres which gives a tremendous preference to small angle scattering we should multiply the kinetic theory radii by about 1.5. It is then evident that except in the case of hydrogen and helium, the hard sphere picture is not sufficient to account for the scattering at very small angles.

Gas	σ_{12} in A angle = 4′	σ_{12} in A angle = 1°	σ_{12} in A Kinetic Theory
H_2	7.2	5.7	4.18
He	6.9	5.0	3.95
Ne	8.7	6.0	4.20
N_2	12.5	7.3	4.64
A	11.3	8.8	4.49
CO_2	13.3	9.6	4.78

42. Deflection of Cosmic-Ray Secondaries in Magnetized Iron. W. F. G. SWANN AND W. E. DANFORTH, JR., *The Bartol Research Foundation.*—A mathematical analysis by one of us (W.E.D.), taking into account counter sizes and distances, has shown that the results of L. M. Mott-Smith's experiments on deviation of cosmic rays by magnetized iron are not inconsistent with the assumption that magnetic induction is the fundamental vector operative to cause the deflection. The said experiments, however, appear inconclusive for a decision of the point. We have repeated these deflection experiments under conditions which take account of the geometrical considerations involved and of the energy loss of the particles in the iron. In the actual experiments a 7.8 percent decrease of counting rate was observed with a probable error of 1 percent. On the assumption that the magnetic induction B is the vector involved, the results can be explained on the assumption that those rays having energy greater than that necessary to penetrate the iron (4.5×10^8) have an "effective" energy of 1.9×10^9. On the other hand, the assumption that the magnetic intensity H is the vector concerned would point to an energy much less than that necessary to penetrate the iron.