

or in a solid, the molecular groups, which are in thermal agitation, have magnetic moments which are functions of the temperature. Their action on each other is due partly to actual impacts, partly to the magnetic field each sets up in its neighbourhood. In general the second effect is small compared with the first. When an external field is applied, both the impacts and the molecular fields tend to oppose the rotation of the magnetic axes of the molecules or molecular groups into line with the field. If the molecules or groups are elongated in shape the impacts almost entirely prevent rotation and the substance is paramagnetic. If the molecules or groups are spherical the impacts have only a small effect, rotation is resisted mainly by the mutual magnetic actions and the substance is ferromagnetic. Diamagnetism he considers to be atomic in nature and only another aspect of the Zeeman effect.

OUR ASTRONOMICAL COLUMN.

COMET 1913f (DELANVAN).—The following is the ephemeris for Delavan's comet (1913f) for the current week (*Astronomische Nachrichten*, No. 4739):—

	R.A. (true)		Dec. (true)		Mag.
	h.	m. s.	°	' "	
Aug. 6 ...	6	21 19.9	...	+40 40 17.9	
7 ...		24 46.8	...	41 0 47.7	... 6.1
8 ...		28 18.3	...	41 21 20.0	
9 ...		31 54.4	...	41 41 53.7	
10 ...		35 35.7	...	42 2 28.0	
11 ...		39 21.8	...	42 23 1.9	... 5.9
12 ...		43 13.2	...	42 43 34.5	
13 ...	6	47 10.0	...	+43 4 4.6	

The current number of the *Observatory* (August) states that this comet was detected by Mr. W. H. Steavenson on July 4 at an altitude of 1° . It was of about the 6th magnitude, had a nucleus of magnitude 7.5, and a head of five minutes in diameter; daylight prevented the tail from being observed. It is expected that the object will be visible to the naked eye in September and October, but no more confident prediction than this can now be made.

NEBULAR ROTATION.—In this column on June 4 (vol. xciii., p. 361) reference was made to an announcement by Prof. Lowell of the discovery, by spectroscopic means, of the rotation of the Virgo Nebula. Dr. V. M. Slipher now publishes (*Lowell Observatory Bulletin*, No. 62) a brief communication describing in more detail the discovery in question. It seems that about a year ago a spectrogram of the Virgo Nebula N.G.C. 4594 showed the nebula lines to be inclined. A second plate verified the above, but was not considered sufficiently satisfactory to warrant a public announcement of the discovery. A recent photograph confirms the previous deduction, and it is stated that the inclination of the lines, which is analogous to that produced by the diurnal rotation of a planet, "is unmistakable, and leads one directly to the conclusion that the nebula is rotating about an axis." This nebula has a radial velocity of fully a thousand kilometres a second. The nebula is of a "spindle" type, and the slit of the spectroscope was placed over the long axis: these nebulae are thus spirals seen edgewise, as previous observations of their form have led one to believe. The fact is now proved. Dr. Slipher promises the details of the observations in a general discussion of the spectro-

graphic observations of nebulae made since 1912. Some of the numerous spectrograms of nebulae taken at Flagstaff have shown indications of inclined lines, among them being the great nebula in Andromeda, and he hopes to give a definite answer to the important question of the rotation of this the greatest of spiral nebulae.

SOLAR PHYSICS OBSERVATORY, CAMBRIDGE.—The first annual report of the director of the Solar Physics Observatory, Cambridge, to the Solar Physics Committee covers the year commencing April 1, 1913. The introductory remarks contain a statement indicating the circumstances in which the observatory is now administered, and deplore the loss of three members of the committee, namely, Sir George Darwin, Sir Robert Ball, and Sir David Gill, since the appointment of the committee in June, 1912. After a reference to the purchase of additional land extending down to the Madingley Road and to the selection of instruments to be used, the new buildings are next described. These include an extensive and complete laboratory building forming an extension at the west end of the astrophysical building, a spectroheliograph house, a dome 27 ft. in diameter for the 3-ft. reflector, etc. The energies of the staff are stated to have been chiefly confined to getting the observatory into working order, and for this reason systematic work not involving fresh observations was undertaken, and night work put somewhat in abeyance. Under the heading "Stellar Work," the photographic and visual observations made with the Newall telescope are recorded. These consist of spectrograms of variable stars and visual observations of the spectra of fine novæ. A discussion of spectrograms of Nova Persei No. 2 has been completed, and an atlas of typical stellar spectra with assigned chemical origins of the lines is in course of preparation. Under the heading, "Solar Work," that with the spectroheliograph and the McClean solar instruments is dealt with, while in meteorological physics a brief account is given of the investigations in atmospheric electricity and experimental work on ionising radiations. Preparations were made for the observations of the coming eclipse of the sun, the director and two members of the staff planning to take up their station near Feodosia in the Crimea.

ANNALS OF THE ROYAL BELGIUM OBSERVATORY.—The second part of vol. xiii. of the *Annals of the Royal Observatory of Belgium* contains three separate memoirs. The first is confined to the details of observations of variable stars made at that observatory during the period 1907 to 1912 by Messrs. G. van Biesbroeck and L. Casteels. Forty-six stars are here studied and the total number of observations published is 3225. Chief attention has been paid to new variables which have not been well studied. In many cases their identity was so ambiguous that the authors have studied the stars themselves, and for the sake of future observers have published charts of the regions where those stars were not included in the Bonner *Durchmusterung*. In many cases light curves accompany the text. The second portion of the volume brings together the observations made with the 38 cm. aperture equatorial by Dr. G. van Biesbroeck during the period 1907 to 1912; these comprise the observations of double stars, comets, minor planets, and phenomena. The third and last portion, by M. L. Casteels, summarises the physical observations of comets made by him in the years 1910 and 1911. Both the second and third portions are accompanied by numerous illustrations of the details observed in comets' heads.