

LOWELL OBSERVATORY

BULLETIN No. 62

VOL. II

No. 12

THE DETECTION OF NEBULAR ROTATION

A spectrogram of the Virgo Nebula, N. G. C. 4594, made a year ago showed the nebular lines to be inclined. A second plate was immediately undertaken but failed, through exasperating circumstances, of a sufficient exposure—although it verified as far as it went, the inclination; and I resolved to withhold any announcement until a second satisfactory plate might be obtained. This observation is now available and fully confirms those of a year ago. 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. Although from the time of Laplace it has been thought that nebulae rotate, this actual observation of the rotation is almost as unexpected as was the discovery that they possessed enormously high radial velocities. The fact that this nebula has a radial velocity of fully a thousand kilometers per second, as established here a year ago, makes it not so surprising that it should also be rotating rapidly.

The slit of the spectrograph was placed over the long axis of the nebula which is of the "spindle" type and hence the observation shows clearly that such nebulae are—as previous evidence tended to show—spirals seen edge-wise.

The details of these observations will be given later in a general discussion of the spectrographic observations of nebulae begun here in 1912.

The discovery of the rotation of this nebula has

opened a new field for investigation and that further observations will disclose other nebulae to be in rapid rotation may be confidently expected. The numerous spectrograms of nebulae that have been secured here contain a few with indications of inclined lines, among them those of the great Andromeda Nebula. The brightness and favorable location of this nebula place it within the reach of a considerably more dispersive spectrograph than the one I have been using. Moreover, for the observation of the rotation of such large objects the power of the spectrograph can be much increased by decreasing the aperture of the telescope. However the present instrument is more generally applicable and it has shown exceptional efficiency. Its power for the detection of rotation may be better understood when it is pointed out that it gives half as much inclination to the spectral lines as would the powerful three-prism spectrographs as used in velocity work with the great Lick and Yerkes refractors and yet requires less than one-seventy-fifth as much exposure as they would need for such nebulae. In the light of present developments there is promise that the application of these further instrumental possibilities, which will be made as soon as this object comes into observing position, will give a definite answer to the important question of the rotation of this the greatest of the spiral nebulae.

V. M. SLIPHER.

Flagstaff, Arizona, May, 1914.