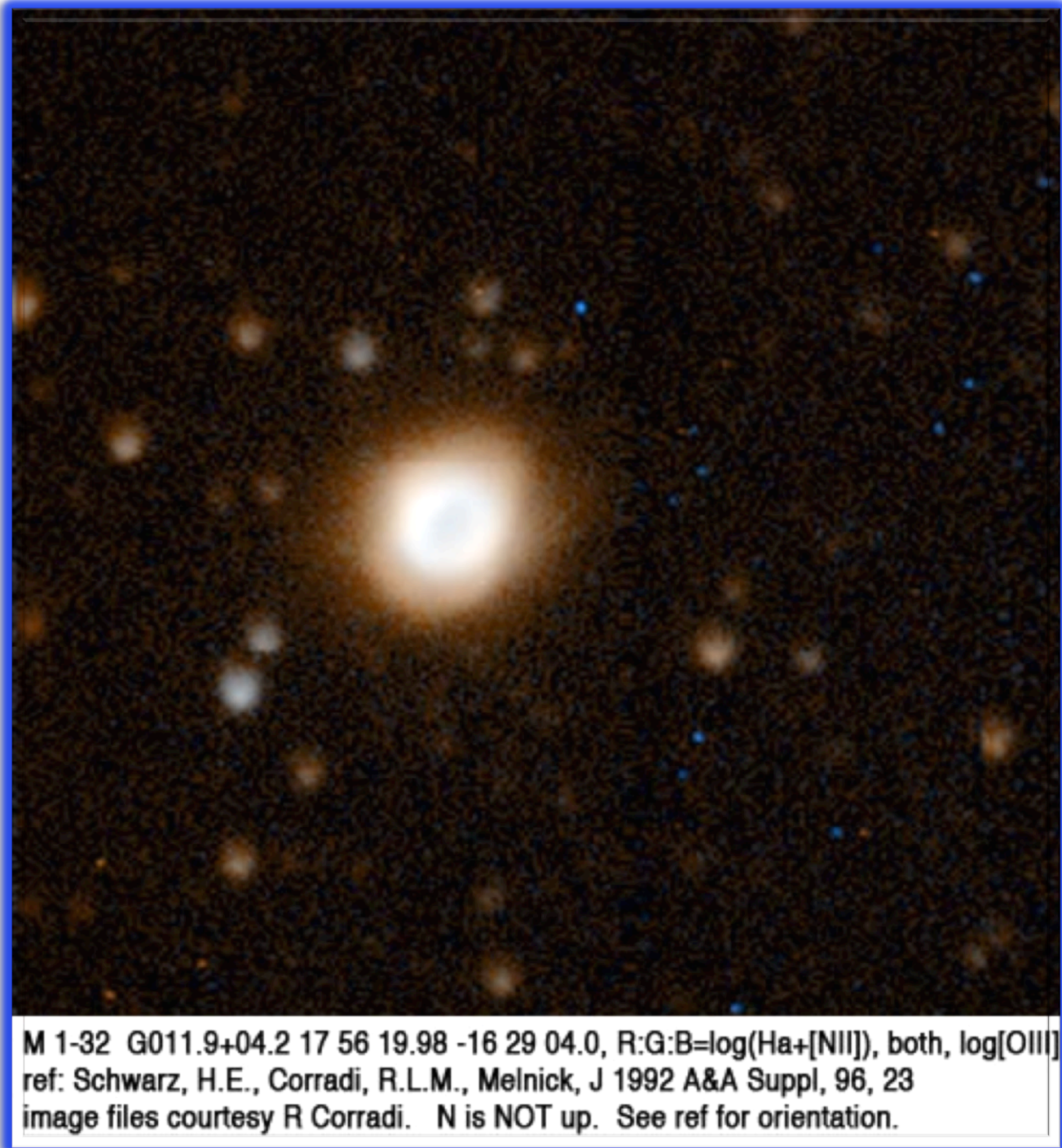


Abstract

The planetary nebula M1-32, which has a [WC4-5] nucleus, shows a very complex kinematics with bipolar outflows reaching ± 200 km/s, while the main body is expanding radially with velocity of 15 km/s (Akras & López 2012). Using high-resolution spectra obtained with the spectrograph MES, attached to the 2.1-m of OAN- SPM, we present a study of the nebular kinematics. Three slits were located passing through the center, and both nebular sides. The spectra at the sides show similar kinematics that the central slit, and in addition a sort of ansae at low velocity are found.

Background



M1-32 shows a complex velocity field (Medina et al. 2006; Akras & López 2012). Its line profiles are very wide at the base due to bipolar ejections. It also has a peculiar chemistry with an extremely high C/O ratio (García-Rojas et al. 2013; poster A24).

Emission lines

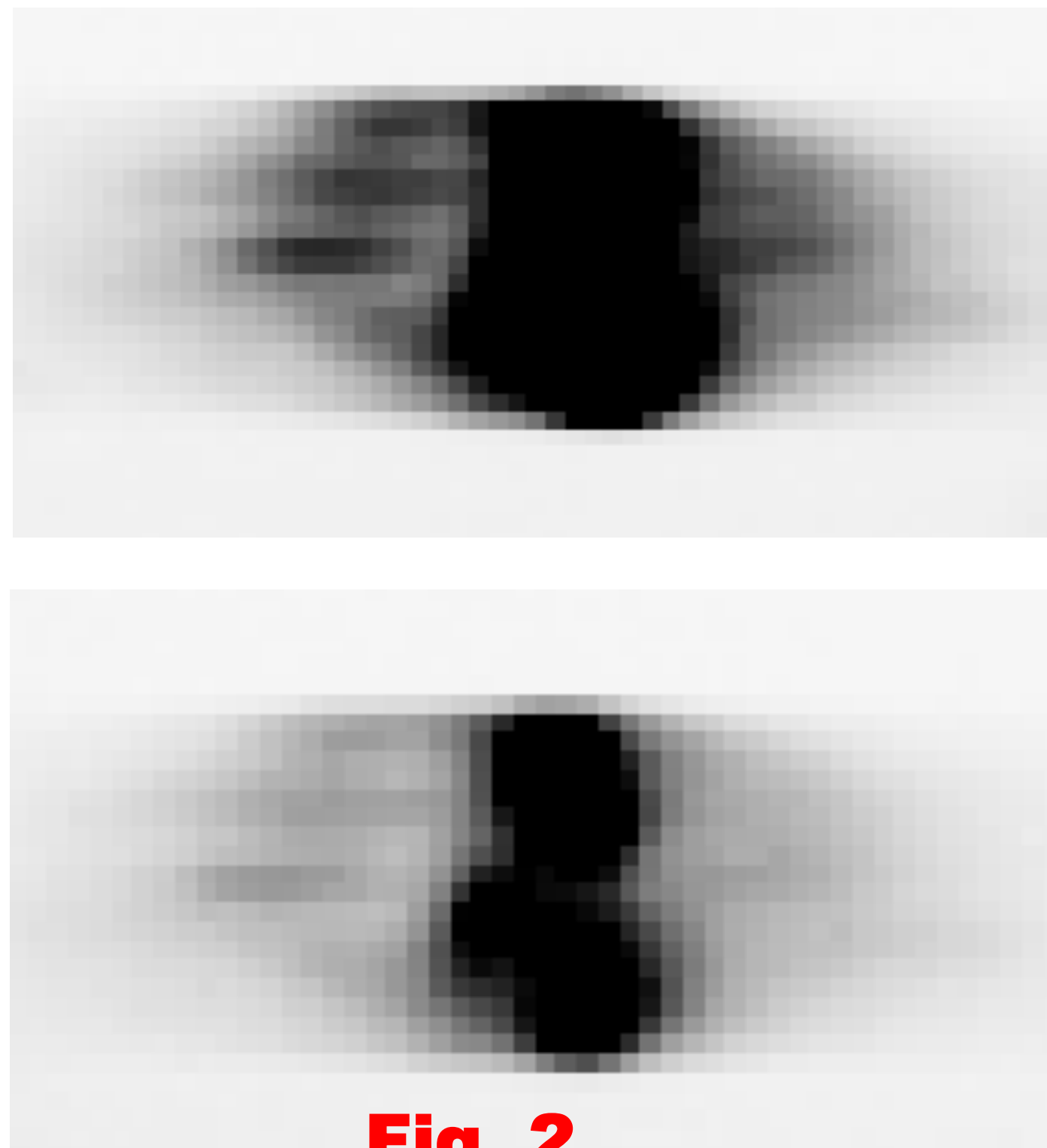


Fig. 2

Fig.2. 2D [SII] lines from Clay-MIKE. 3 dense central knots at systemic velocity are apparent. Blue and red filaments, leaving the bright knots are due to bipolar ejections present in this object. About: [SII]6730, below: [SII]6716

Velocity profile

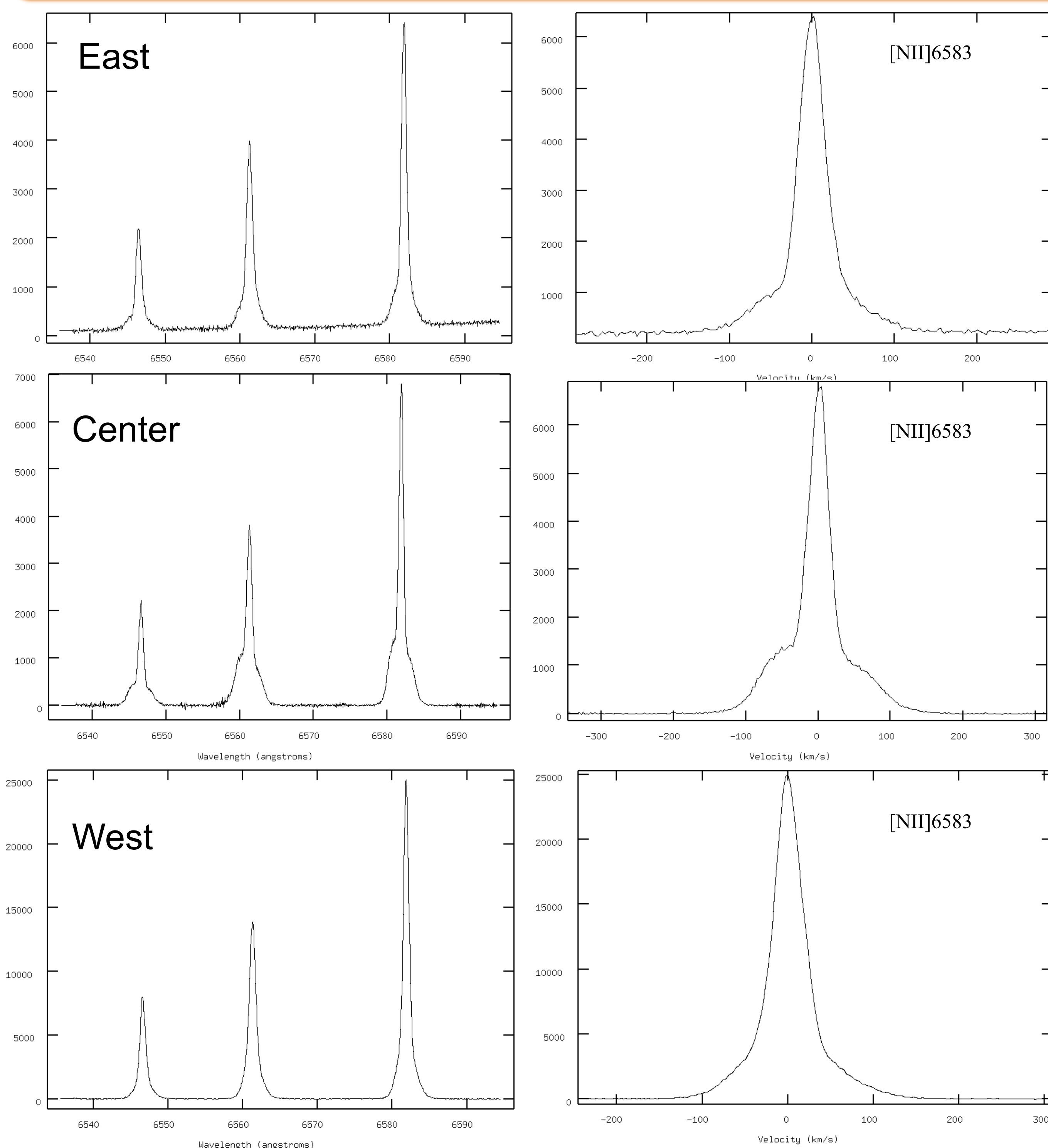


Fig. 3

The velocity profiles of H α and [NII]s in the 3 positions of the nebula extend up to ± 100 km/s. The lines of the central zone have more protuberant and broader wings than the lines in the E and W. This indicates that the gas in this area is at high speed. Fig. 3

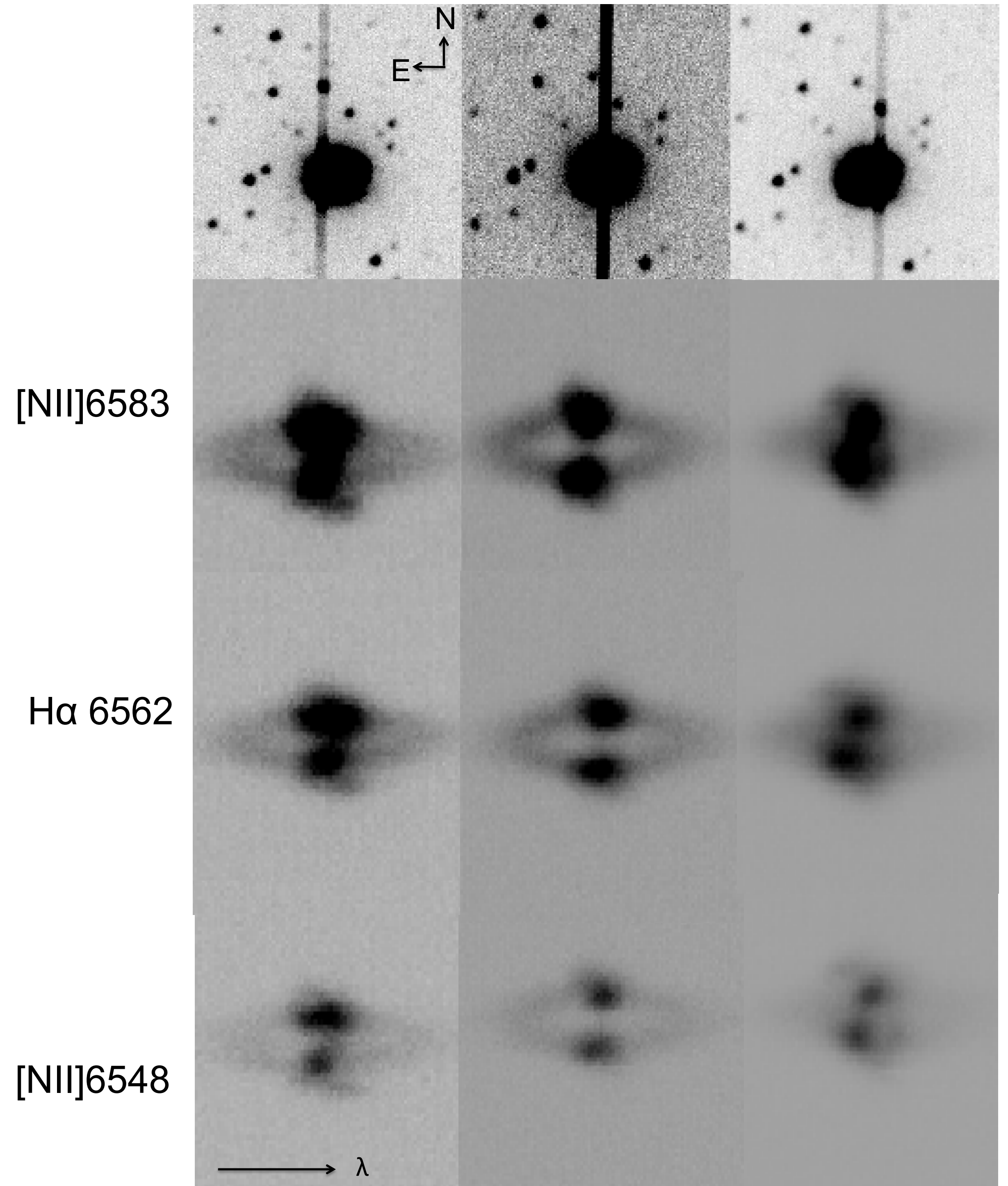


Fig. 1

Fig.1, Slit positions and spectra are shown. The bright knots corresponds to a face-on torus. The wide components are bipolar outflows. At both sides (first and third rows) there is a slightly inclined weak component, possibly ansae at ± 20 km/s.

3D Morpho-kinematics model

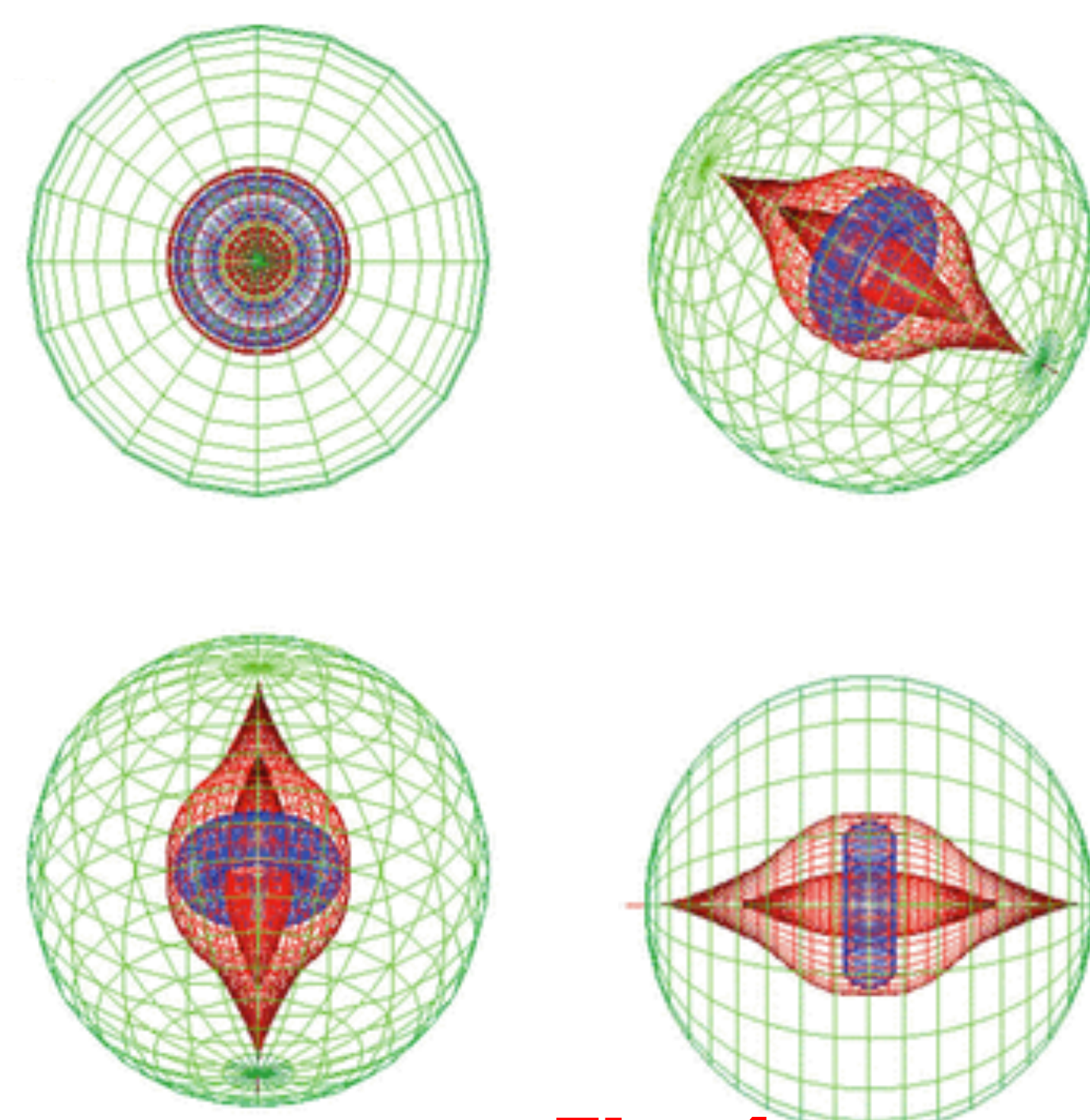


Fig. 4

3 D morpho-kinematics model (Akras & López 2012), suggests that this object has a cylindrical velocity field. The model reproduces the collimated bipolar outflows observed. Fig.4

Preliminary conclusions

- According to fig. 2, the planetary nebula M1-32 has a toroid and a bipolar ejection.
- There is a slightly inclined weak component at both sides (E and W) of the planetary nebula, these components are possibly ansae at velocities of ± 20 km/s .
- The extension of velocity profile reaches to more than ± 100 km/s.