# Model predictions for spectro-interferometric observables of disks with various geometry and kinematics

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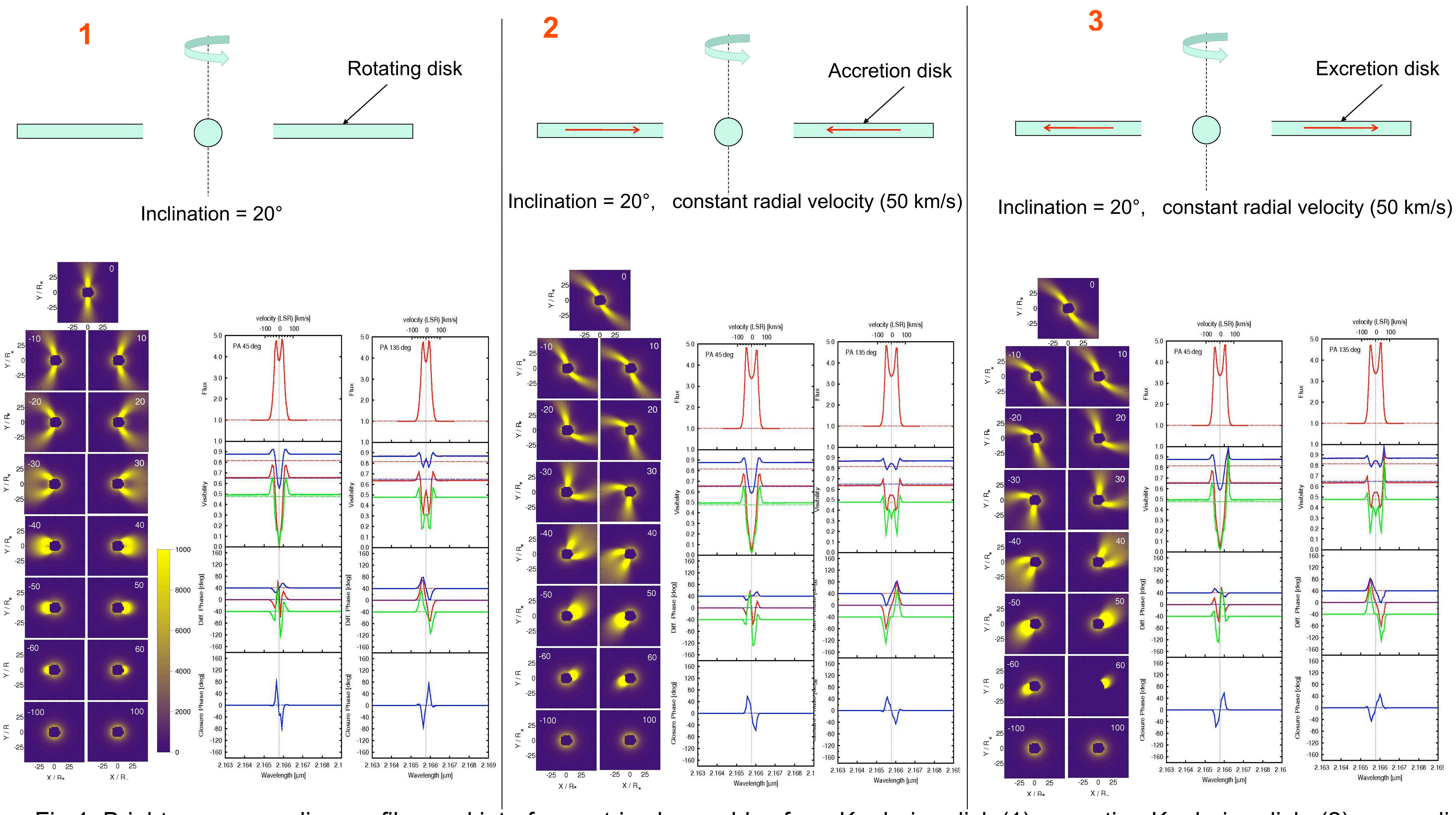
## INTRODUCTION

We consider different types of gaseous disk models to compute model predictions of spectro-interferometric observables such as visibilities, differential phases, closure phases, and line profiles measured with high spectral resolution (e.g., AMBER observations with a spectral resolution of 1500 or 12000). We computed interferometric observables (Figs. 1 and 2) of Keplerian disks, accretion and excretion disks, disks with disk wind (Fig.2) as well as biconical outflows or stellar wind. These models allow us to study the dependence of the interferometric observables on the wavelengths within emission lines, the inclination of the disk, and various physical properties of the star-disk system.



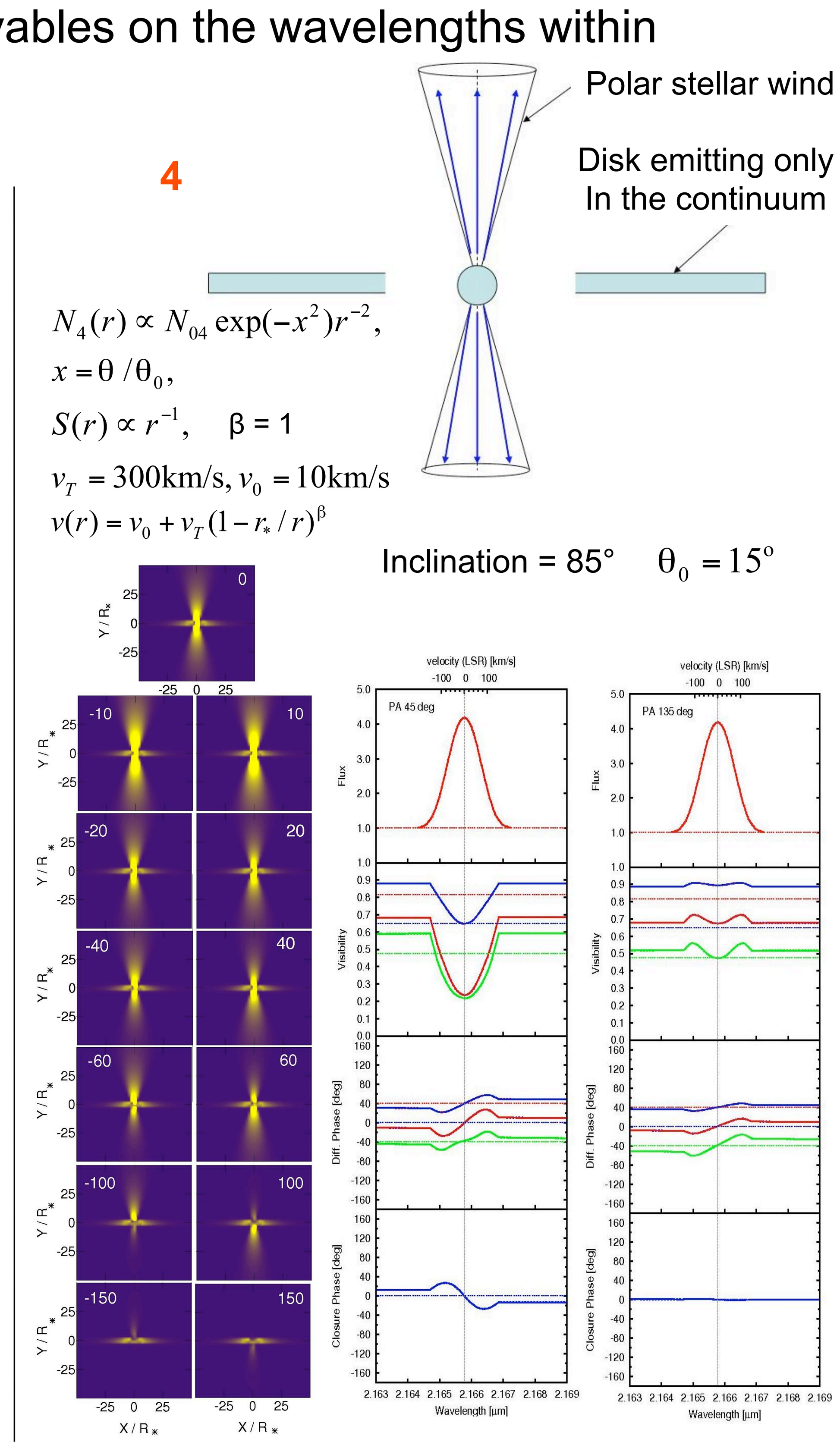



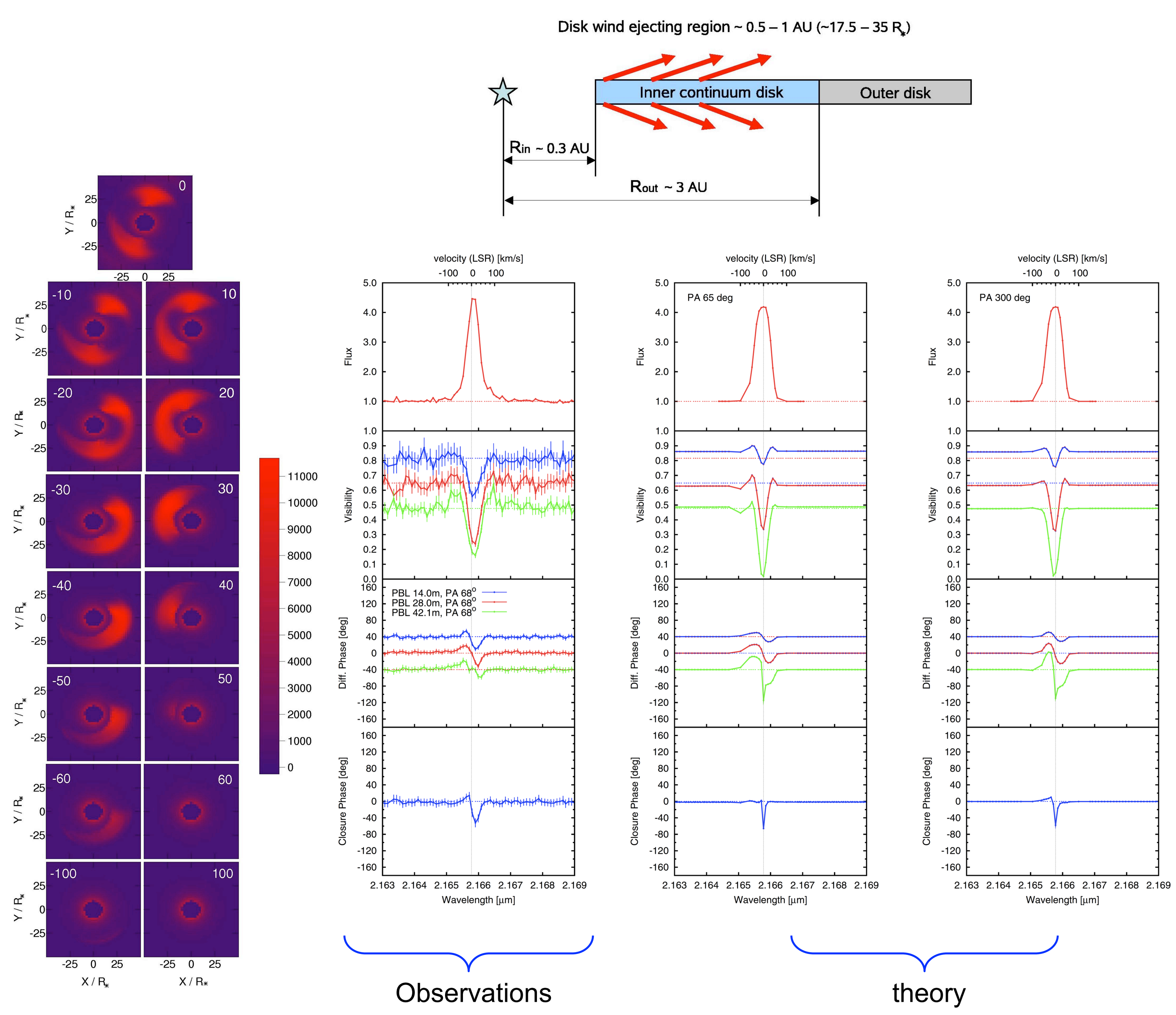

Fig.1. Brightness maps, line profiles and interferometric observables for a Keplerian disk (1), accreting Keplerian disk (2), expanding Keplerian disk (3), and a polar outflow (4).

Figure 1 presents sketches for several models of disks and outflows (shown at the top in green color) with the stellar parameters of MWC 297 (see Weigelt. et al. 2011 for parameter details), calculated intensity distributions of the emitting regions at the center of the Brγ line (v = 0 km/s) and other velocities (given in each image from 0 to 100 or 150 km/s together with the disk size scale), line profiles corresponding to the models, and interferometric observables, i. e., visibilities, wavelength-differential and closure phases (from top to bottom) for 2 orthogonal position angles (PAs) of the linear VLTI array E0-G0-H0 . The inclination angle *i* is the angle between the polar axis and the viewing direction. The colors represent the intensity in ergs/(ster s Å cm²), and are the same for all models. Geometrical parameters (inner and outer radii), and the disk continuum are calculated as in Weigelt et al. 2011 (see Fig. 2).

Variables of model 4: spherical radius *r* , population of the fourth level $N_4$, source function *S* , terminal velocity $v_T$ , $\theta$ is the angle between the vertical axis and the radius-vector. The introduction of the exponential function in $N_4$ permits us to avoid sharp boundaries in the wind cone. The outflow does not have any rotational velocity. These modeling results illustrate the dependence of the interferometric observables on model type (e.g. Keplerian disk, accretion disk, excretion disk, outflow), amount of radial motion, and inclination angle.

Fig. 2 AMBER observations and disk-wind modeling of the Herbig Be star MWC 297.

Figure 2 shows AMBER observations (spectral resolution R = 12000; Br γ region) and modeling of the disk and disk wind of the bright Herbig Be star MWC 297 (*Weigelt et al. 2011, Grinin and Tambovtseva 2011*). A sketch of the disk plus disk wind region and the parameters of the wind launching region are shown at the top. We obtained a half-opening angle (=angle between the polar axis and the innermost wind streamline) of θ ~ 80°. This large opening angle is probably caused by the strong radiation pressure of this hot star. The best-fit model has a disk inclination angle of ~ 20°. We showed that all observables can be explained by the employed magneto-centrifugally driven disk-wind models.




References

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Weigelt G., Grinin V.P., Groh J., et al. 2011, A&A, 527, 103