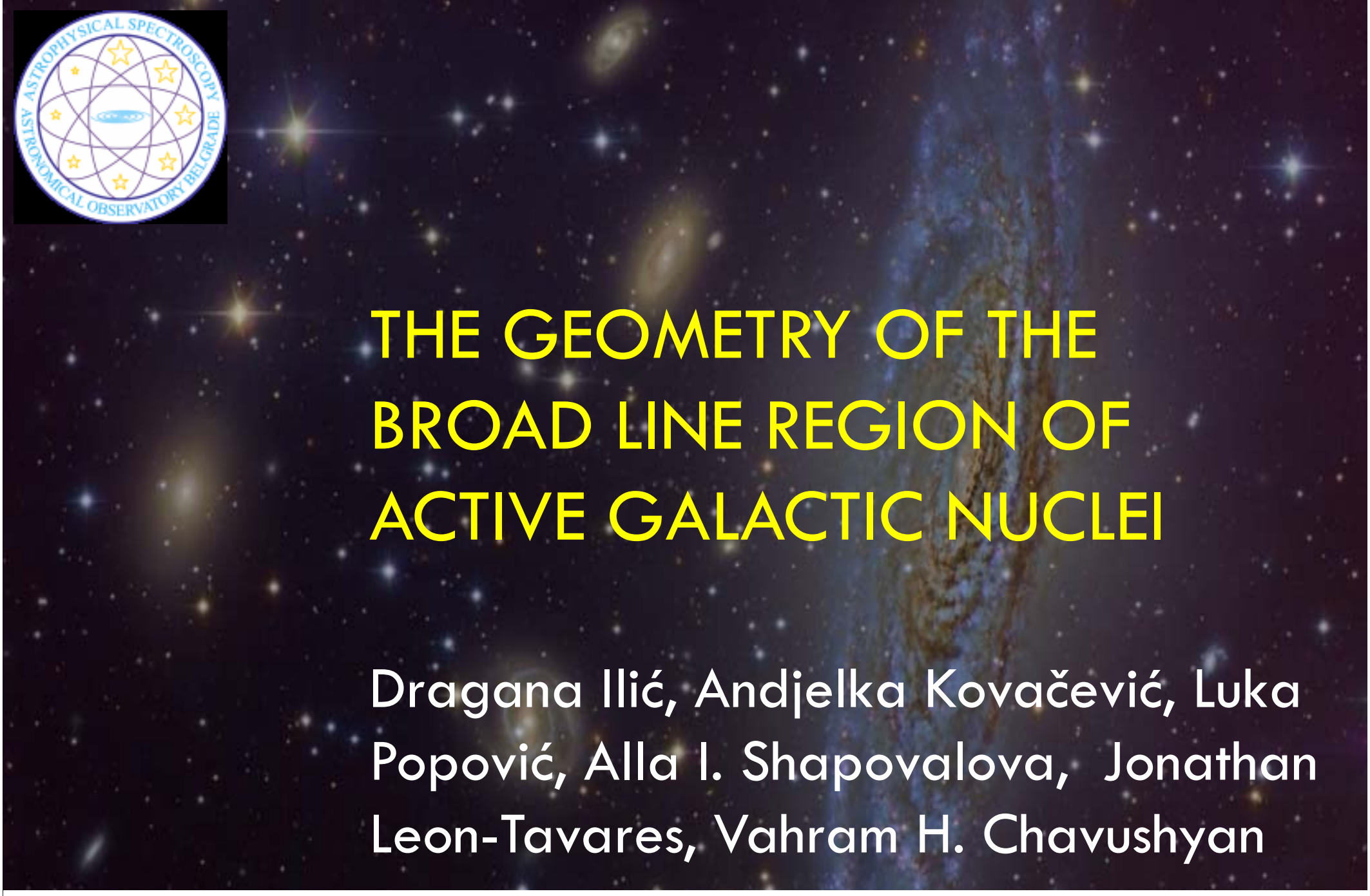

THE GEOMETRY OF THE BROAD LINE REGION OF ACTIVE GALACTIC NUCLEI

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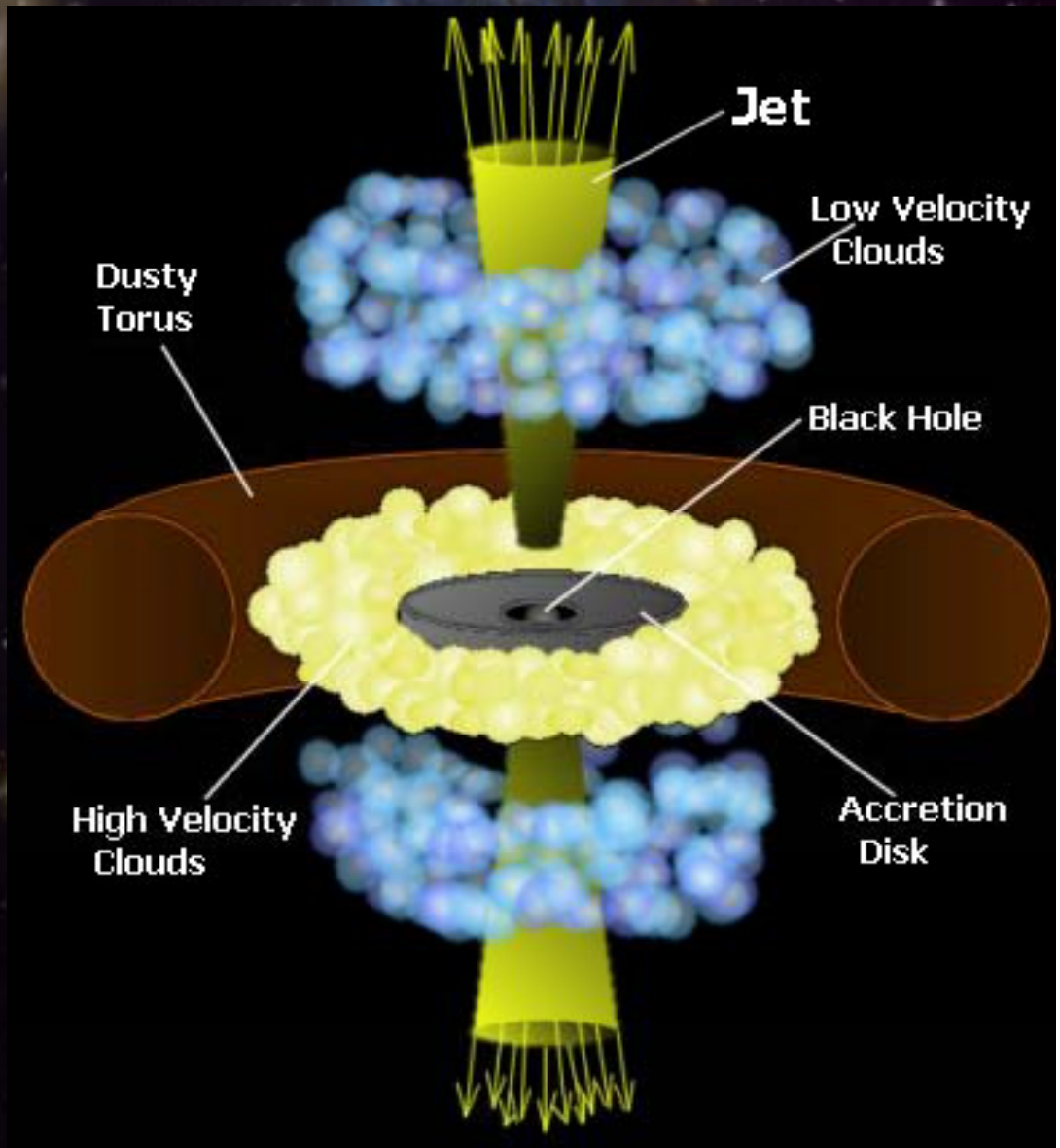
Active Galactic Nuclei (AGN)

- massive black hole
- accretion disk
- Broad Line Region= **BLR**
- Narrow Line Region = **NLR**
- torus
- jets

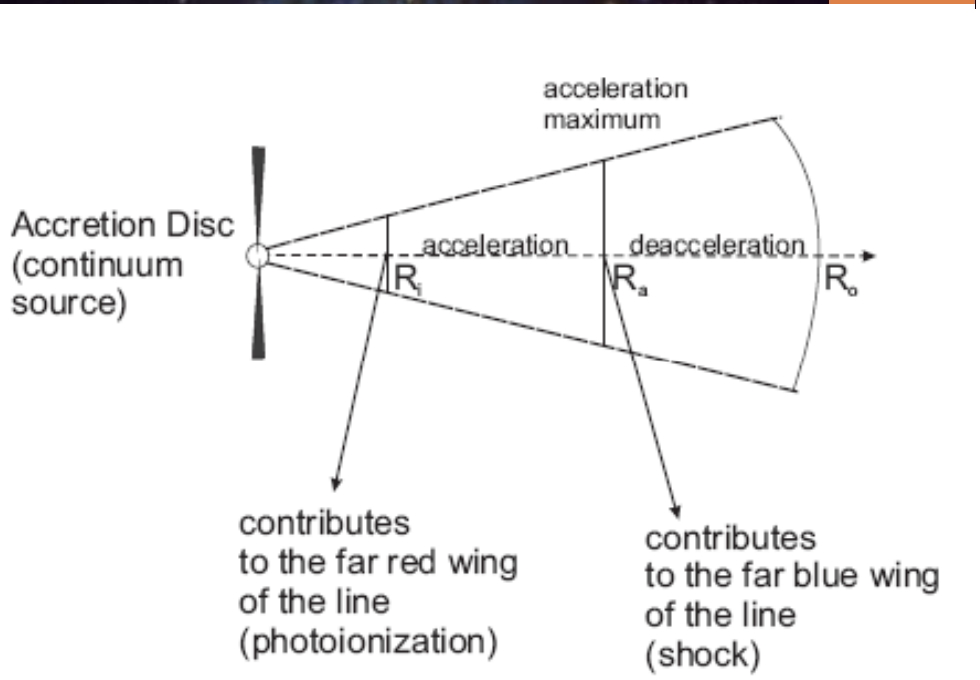


Broad Line Region (BLR)

- FWHM ~ up to 10,000 km/s;
- Dimensions ~ lt-days up to lt-month
- complex line shapes (large widths; double-peak lines; asymmetry) => complex and stratified region (at least 2 subregions)
- geometry not known: more than one proposed model (eg. Biconical ejection, two-component model, the rotational accretion disk model...)

OUTFLOW MODEL

- accelerating outflow in emission region - starts very close to the massive black
- take into account the gravitational redshift
- random velocity component



Line Profile:

$$I(\lambda)=\frac{1}{R_0-R_i}\int_{R_i}^{R_0}\varepsilon(r)\cdot\exp\left(-\left(\frac{\lambda-\lambda_0-\Delta\lambda_r(r)-\Delta\lambda_g(r)}{w(r)}\right)^2\right)dr$$

Radial velocity:

$$\Delta\lambda(r)=\frac{Vr}{c}\lambda_0$$

Gravitational redshift:

$$\Delta\lambda_g(r)=\frac{Vg}{c}\cdot\lambda_0=\left(-1+\sqrt{1-\frac{2}{r}}\right)\cdot\lambda_0$$

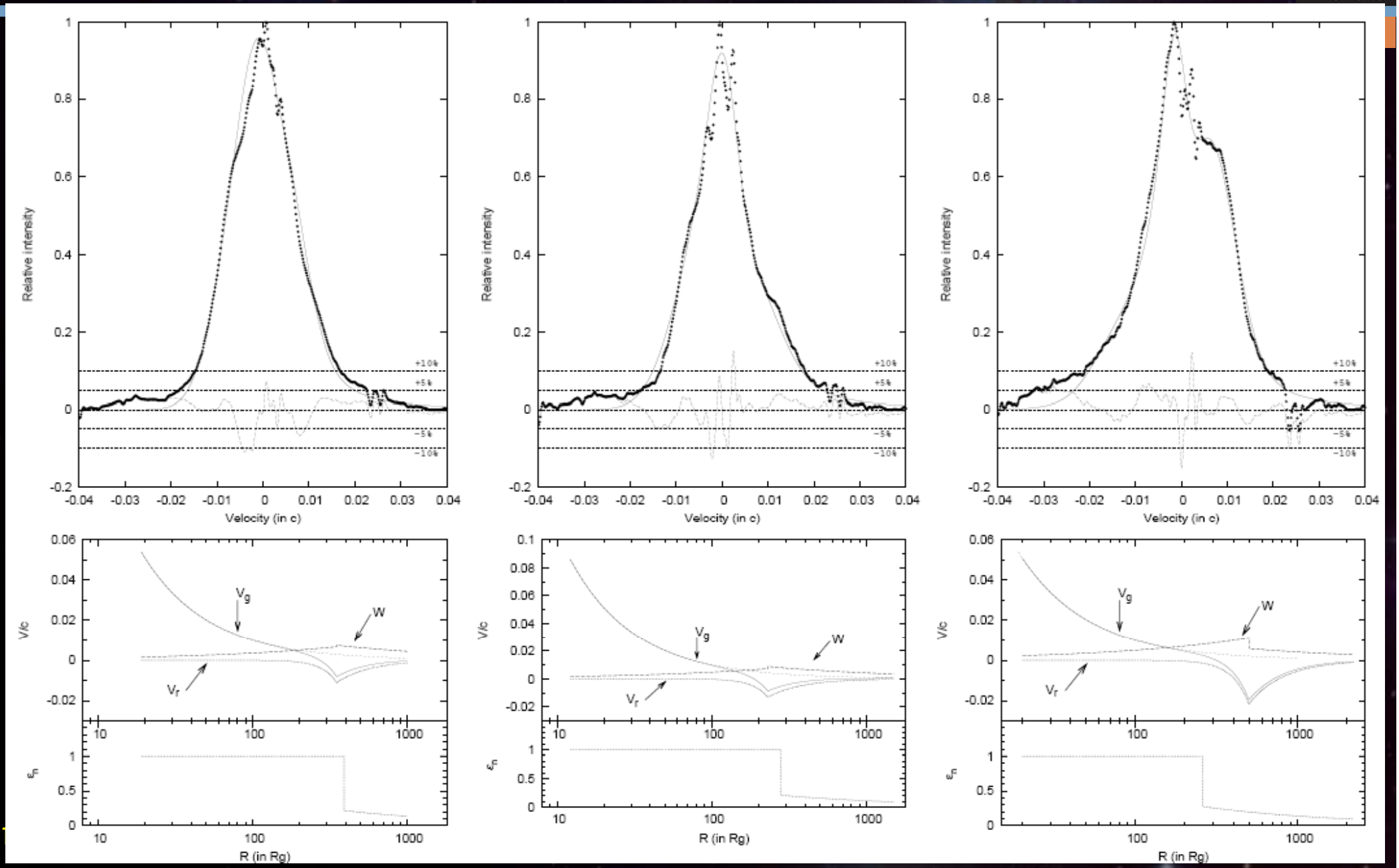
Random velocity:

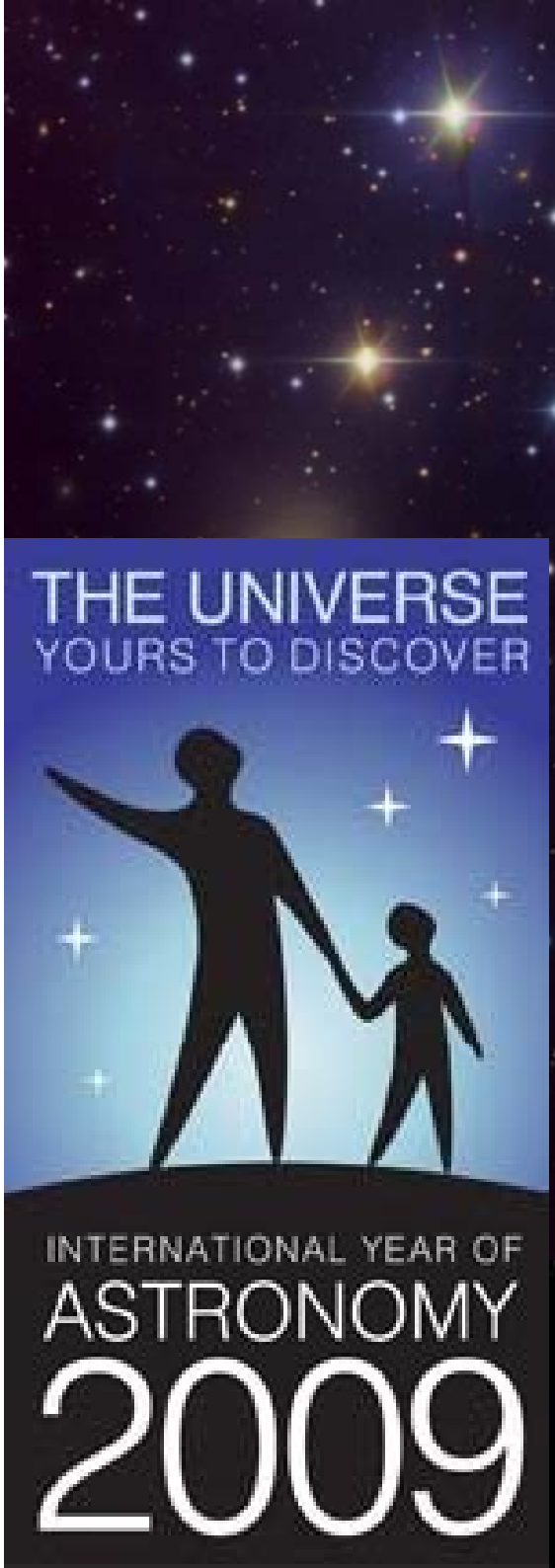
$$w(r)=\frac{V_{ran}(r)}{c}\lambda_0$$

Model vs. observations

- applied to the average Hα of NGC 4151 from three characteristic periods (for data see Shapovalova et al. 2008)
- the model can describe well the observed emission line profiles from all three periods
- the predicted radius of acceleration is in good agreement with theoretical model of radio-jet formation: the acceleration of radio-jet is in the same range of Rg (Marscher 2005, Lobanov 2007).

NGC 4151 (Ilić et al, in prep)

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Thank you!