From gappy to ringed: signatures of the accretion disk radial structure in profiles of the reflection line

Štolc M., Zajaček M.,Karas V.

RAGtime 22 online

19-23 October 2020

Active Galactic Nucleus (AGN)

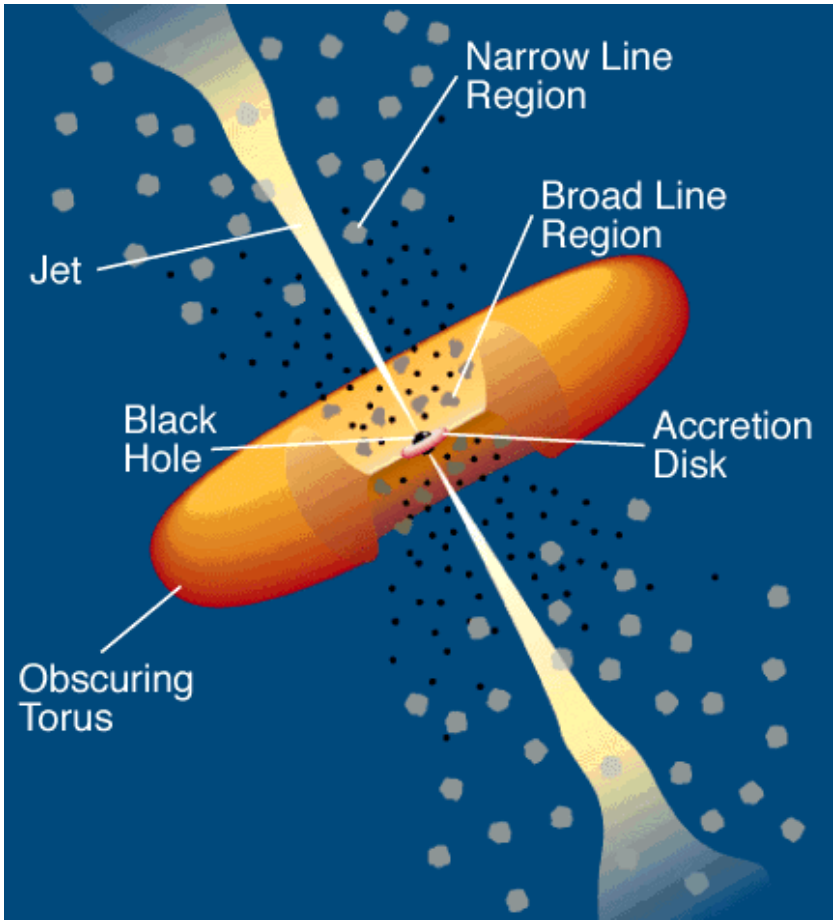

Figure 1: Unified model of AGN. Image credit: C.M. Urry and P. Padovani via `http://goo.gl/d834Zk`

Model

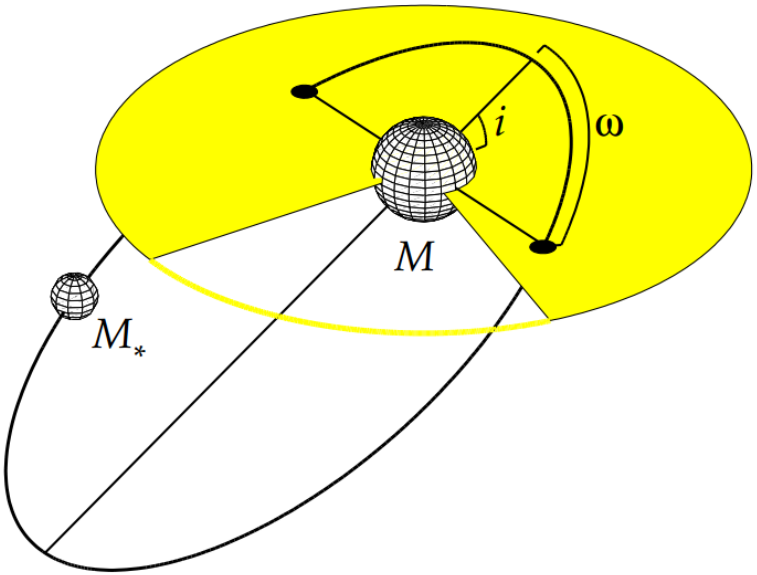

Figure 2: Initial system set-up of our model. Image credit: Šubr et al., 1999

Model

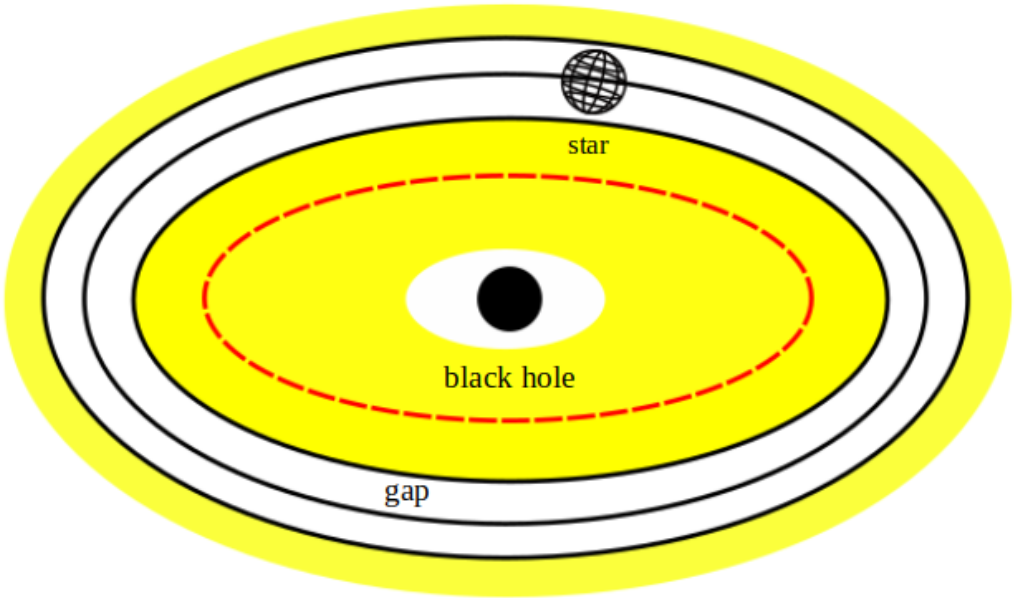

Figure 3: Final system set-up of our model

- $R_{\text{influence of }*} > H$ a gap is created,
- $R_{\text{influence of }*} < H$ no gap is created, density waves

Tidal Disruption Event (TDE)

- tidal radius defined as [Hills, 1975; Rees, 1988]

$$R_{\text{tidal}} = \left(\frac{2M_{\text{SMBH}}}{M_*}\right)^{\frac{1}{3}} R_*$$

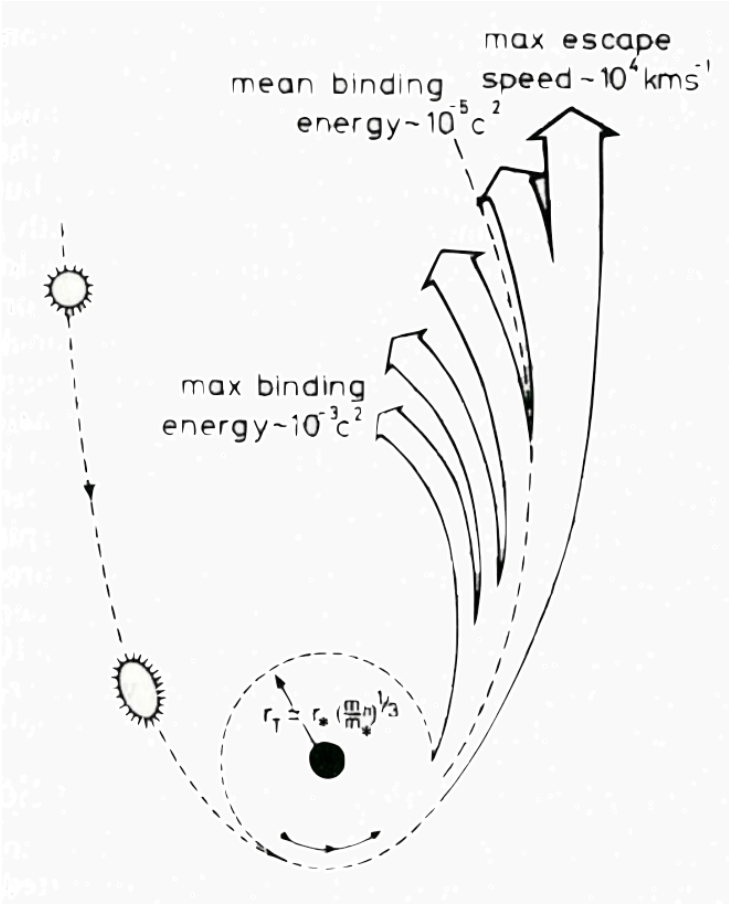

Figure 4: TDE scenario. Image Credit: Rees, 1988

Simulation results I

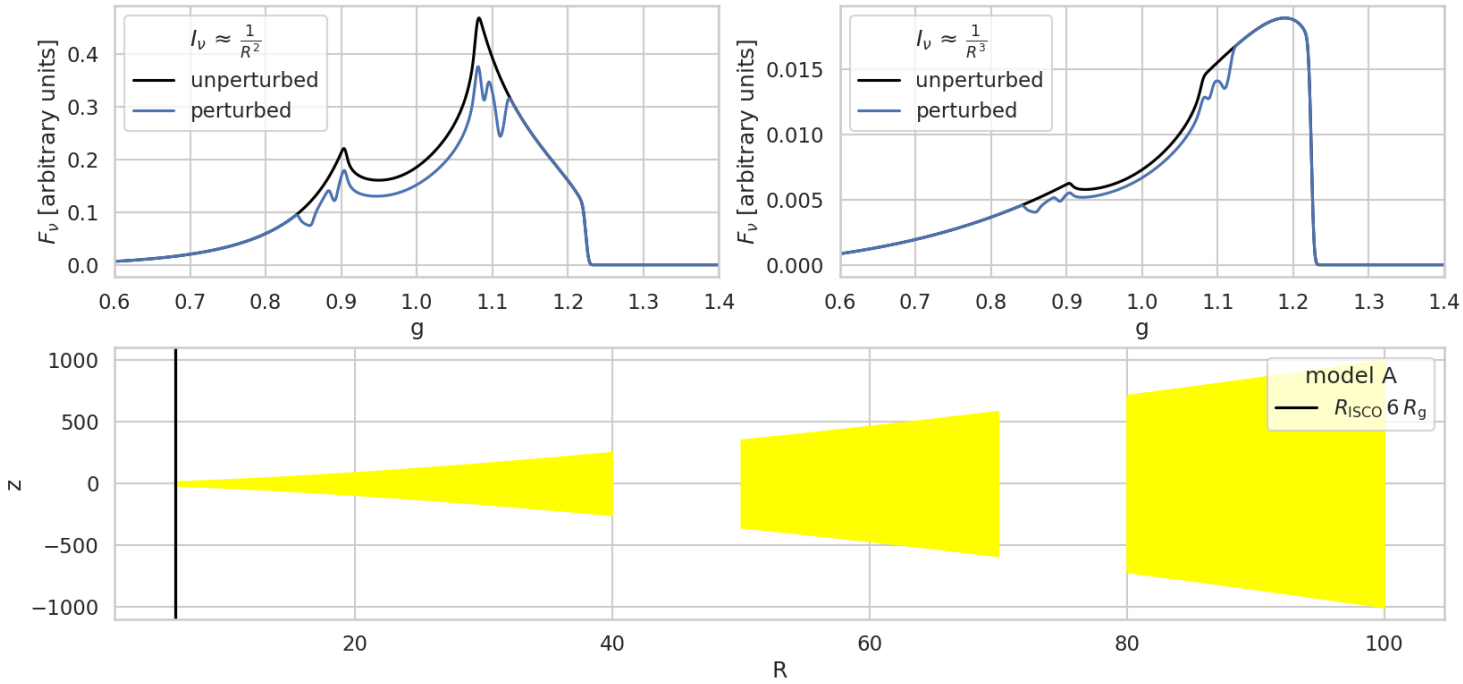

Figure 5: Spectral line profile for model A. The view angle is 60 deg.

Simulation results II

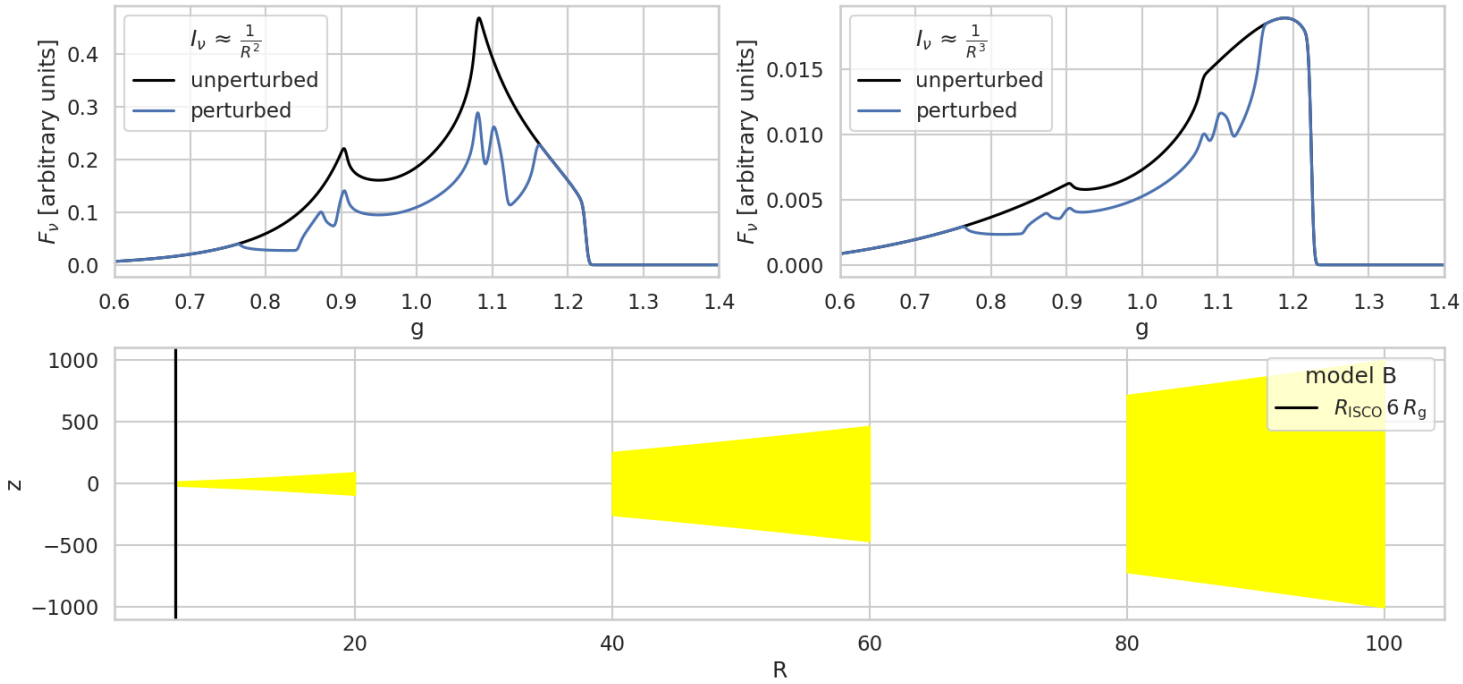

Figure 6: Spectral line profile for model B. The view angle is 60 deg.

Simulation results III

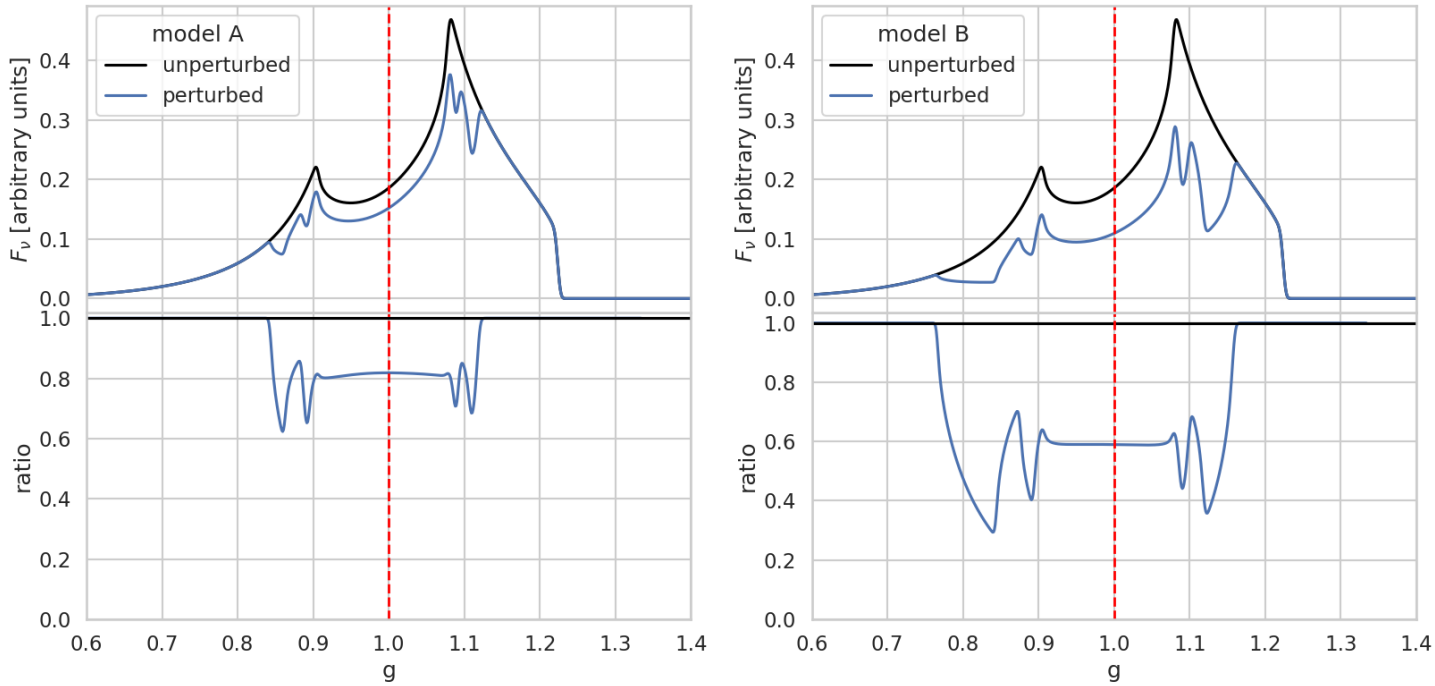

Figure 7: Comparison of spectral line profiles for model A and B with intrinsic intensity $I_\nu \approx \frac{1}{R^2}$. The view angle is 60 deg.

Simulation results IV

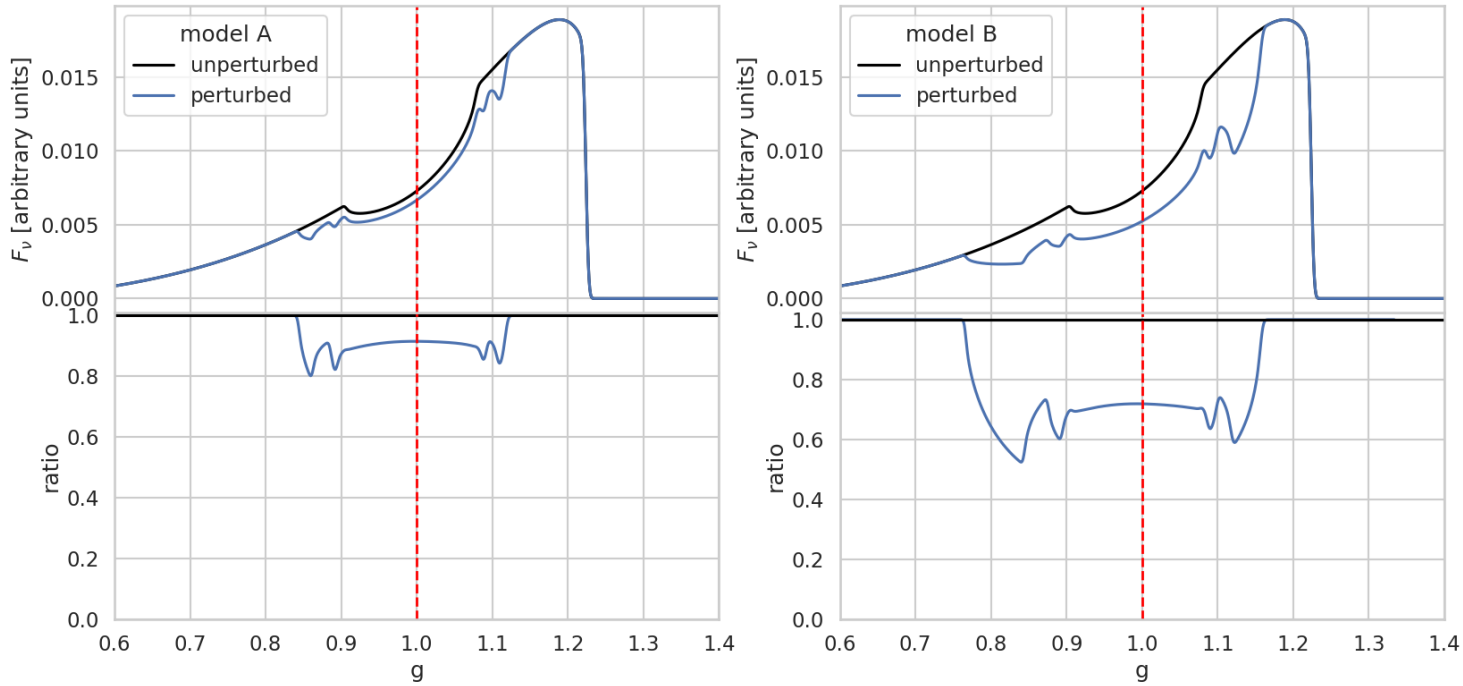

Figure 8: Comparison of spectral line profiles for model A and B with intrinsic intensity $I_\nu \approx \frac{1}{R^3}$. The view angle is 60 deg.

Observational evidence?

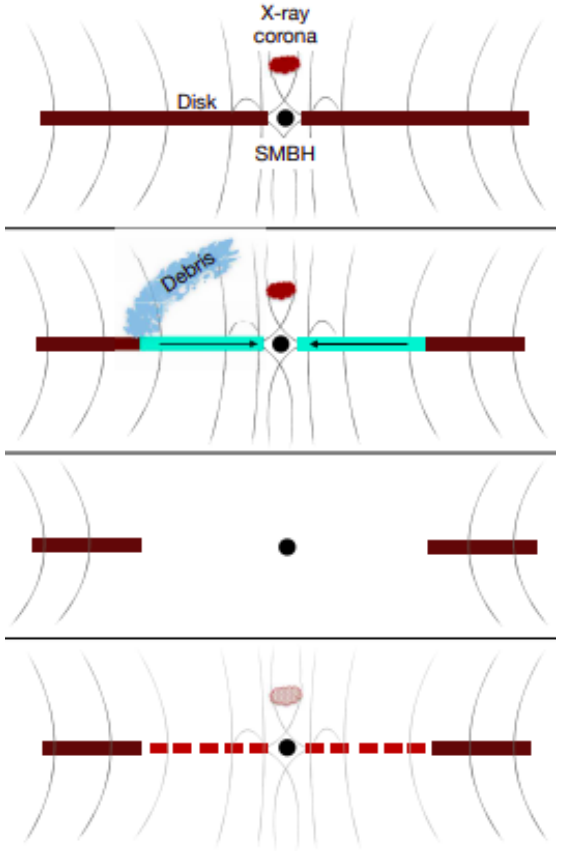

Figure 9: Destruction and recreation of corona caused by TDE (Ricci et al., 2020)

Summary

- N gaps $\Rightarrow$ $(2N + 2)$ peaks
- model A vs. model B - lower flux, clearly distinguishable peaks
- observational evidence - changing-look events