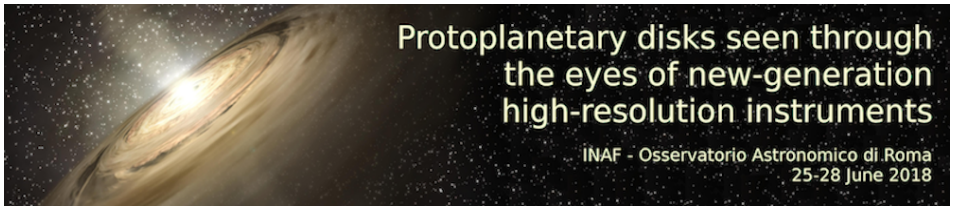

Contribution ID: **19** Type: **Talk**

Eccentricity evolution during planet-disc interaction

Thursday, 28 June 2018 11:20 (20 minutes)

During the process of planet formation, the planet-discs interactions might excite (or damp) the orbital eccentricity of the planet. In this talk, I will present two long (t ~ 3x10^5 orbits) numerical simulations: (a) one (with a relatively light disc, M_d/M_p=0.2) where the eccentricity initially stalls before growing at later times and (b) one (with a more massive disc, M_d/M_p=0.65) with fast growth and a late decrease of the eccentricity. We recover the well-known result that a more massive disc promotes a faster initial growth of the planet eccentricity. However, at late times the planet eccentricity decreases in the massive disc case, but increases in the light disc case. Both simulations show periodic eccentricity oscillations superimposed on a growing/decreasing trend and a rapid transition between fast and slow pericentre precession. The peculiar and contrasting evolution of the eccentricity of both planet and disc in the two simulations can be understood by invoking a simple toy model where the disc is treated as a second point-like gravitating body, subject to secular planet-planet interaction and eccentricity pumping/damping provided by the disc.
I will show how the counterintuitive result that the more massive simulation produces a lower planet eccentricity at late times can be understood in terms of the different ratios of the disc-to-planet angular momentum in the two simulations. In our interpretation, at late times the planet eccentricity can increase more in low-mass discs rather than in high-mass discs, contrary to previous claims in the literature.

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