

---

PPS004-06

Room: 201A

Time: May 25 10:15-10:30

## On the gap formation in a protoplanetary disk

Takayuki Muto<sup>1\*</sup>

<sup>1</sup>Kyoto University

We analyze the physical processes of gap formation in an inviscid protoplanetary disk with an embedded protoplanet using two-dimensional local shearing-sheet model. Although it has been considered that the gap opening is possible only for planets more massive than Saturn mass at 1 AU of Minimum Mass Solar Nebula, we have found that gap formation is also possible for lower mass planets, provided that the disk is not in a very turbulent state. Spiral density wave launched by the planet shocks and the angular momentum carried by the wave is transferred to the background flow. The exchange of the angular momentum can affect the mass flux in the vicinity of the planet to form a gap around the planet. To study the gap formation process, we perform high-resolution numerical calculations and weakly non-linear analyses, which is applicable to low-mass planets. They have shown good agreement for planet mass lower than 10 Earth mass.

Keywords: planet formation theory, protoplanetary disk, Disk-planet interaction