

ASTROPHYSICS SEMINAR

Wednesday, 23 April 2008 at 11:00

The effect of a planet on the dust distribution in a 3D protoplanetary disk

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Abstract. With the coming new generation of observation facilities such as ALMA, we hope to discover new planets by direct imaging. For instance, Wolf & D'Angelo (2005) showed that it will be possible for ALMA to detect the gap created by a Jupiter mass planet embedded in a circumstellar disk and orbiting at 5 AU from a solar mass star in a region 140 pc away from the observer. Their study relies on simulations of a pure gaseous disk and the assumption that dust is well-mixed to the gas. But, depending on grain size, this assumption is not always valid and grains decouple from the gaseous motion. We instead use a 3D, two-fluid SPH code and show that the gap created in the dust layer is much more striking than in the gas. We also note a pile up of dust at the external edge of the gap. We therefore expect that gaps created by planets even lighter than 1 Jupiter Mass will be observable with ALMA. I will present our detailed results for different grain sizes and planet masses. Each study will be done for the two different cases of a Minimum Mass Solar Nebula (MMSN) and a standard T Tauri disk, i.e. a compact disk and a more radially extended one. And I will finish with preliminary synthetic images of these structures.

Additional Information

The seminars are given in the ISDC "Pavillon" building
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