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Gas accretion on planets in the debris disc phase

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Since gas has recently been discovered in debris disks, the current model of planetary accretion and evolution doesn't take this gas into account.
However, planets have already been discovered in debris disks with significant amounts of gas (e.g. Beta pic), and models predict that this gas can be regenerated by collisions for 100 Myr, 10 times more than in protoplanetary disks.
Because of this characteristic time, we may use a one-dimensional thermal model based on the stellar structure equation instead of hydrodynamic codes to follow the atmospheric evolution.
An analytical model developed in this context suggests a very efficient accretion. So we need a more complex numerical model to be more accurate.
We will describe how we are developing this model from scratch, based on a code developed to describe atmospheric accretion into protoplanetary disks.
We need to adapt it to the specific constraint of the debris disk as a limited maximum accretion rate.
We also need to determine the right level of complexity in our physical model, such as the radiative transfer description or the equation of state of the gas.
The aim is to determine the influence of different parameters such as the core luminosity, the opacity of the gas, the initial conditions (core mass, initial atmosphere...) on the accretion rate and the atmospheric structure.

Astrophysics Field

Planetology (including small bodies and exoplanets)

Day constraints

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