

Monte-carlo calculations of giant planet formation

Y. Alibert (1), C. Mordasini (1), W. Benz (1) and D. Naef (2)

(1) Physikalisches Institut, Sidlerstrasse 5, CH-3012 Bern, switzerland
(yann.alibert@space.unibe.ch) (2) European Southern Observatory, Alonso de Cordova 3107,
Casilla 19001 Santiago 19, Chile

We present calculations of giant planet formation based on extended core-accretion planet formation models taking into account disk structure and evolution and migration of the protoplanet (Alibert et al. 2005, AA, 434, 343). These models allow the formation of giant planets in a timescale compatible with disk lifetimes. Moreover, these models can be used to reproduce the bulk internal structure of Jupiter and Saturn, as well as the enrichment in volatile species measured in situ by the Galileo probe (for Jupiter), and from the Earth (for Saturn), see Alibert et al. 2005, ApJ, 626, L57.

In this talk, we compare the results obtained using the same models and the data regarding extrasolar planets. For this, we calculate the evolution of many disk+forming planet systems, assuming initial conditions (in particular disk mass, disk lifetime and metallicity of the system) taken from observations. Taking into account the observational bias introduced by radial velocity surveys, we compare in a statistical way the results of our models and the population of know extrasolar planets. We show that our models are able to quantitatively reproduce the mass and semi major axis of extrasolar planets around solar type stars. We also present results for giant planet formation around M dwarfs. Finally, we present predictions for COROT, KEPLER and very high radial velocity surveys (up to 0.1 m/s for very high accuracy spectrograph using ELT class telescopes).