Debris Disk Formation induced by Planet Formation

Hiroshi Kobayashi[1]

[1]Department of Physics, Nagoya University, Nagoya, Aichi 464-8602, Japan

Debris disks are found around main sequence stars. The disks are faint and gas-poor. The disk dust has a short lifetime in the disks caused by radiation pressure, mutual collisions, and Poynting-Robertson drag, and hence the dust is supplied by collisional fragments of kilometer sized or larger planetesimals. However, the collisional destruction of the planetesimals requires dynamical excitation of the planetesimals. If the initial planetesimals are dynamically cold, the planetesimals start runaway growth, resulting in large protoplanets. The stirring of leftover planetesimals by the protoplanets induces debris disk formation. Recently, I improved the collisional fragmentation model consistently with previous the laboratory experiments and numerical simulations of collisions (Kobayashi and Tanaka 2010) and developed the planet formation simulations using the new collisional outcome model (Kobayashi et al. 2010, 2011,2012). Through the simulation, we try to give constrains on the spatial and size distribution of initial planetesimals, and their total mass in a disk from comparison of my model with observational data.