Dust growth, settlement, and dispersal in protoplanetary disks from SED fitting

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Analysis and modeling of the spectral energy distributions (SEDs) of protoplanetary disks around Young Stellar Objects (YSOs) can help us to evaluate the properties and distribution of dust in protoplanetary disks. Using a hybrid of two approaches for fitting the continuum SEDs, i.e., the use of a pre-calculated database and the use of simulated annealing (SA), we have modeled the observed SEDs for four young stellar objects which exhibit in their SEDs some hints of dust growth and settlement in their disks. Our results suggest that the assumption of well-mixed dust and gas leads to overestimation of flux in the far-infrared. Therefore a new disk model is employed to take the effect of dust growth and sedimentation into account. The extended model satisfactorily reproduces all existing observations. The four targets we selected therefore are good candidates for investigating dust growth and settling in protoplanetary disks and deserve follow-up observations. Furthermore, we have selected a sample of 88 young stellar objects on basis of observations of Spitzer c2d and other programs with the goal of systematically studying the structure of transition disks. The sample is divided into two classes, canonical transition disks and homologously depleted disks. We have fit their observed SEDs with the hybrid approach. We find that the most significant difference between the two classes of transition disks lies in the flaring exponent of the disks. In particular, canonical transition disks are generally more flared. Moreover, we find that the disk inner radius is strongly correlated with the effective temperature of the central star as well as the total disk mass.