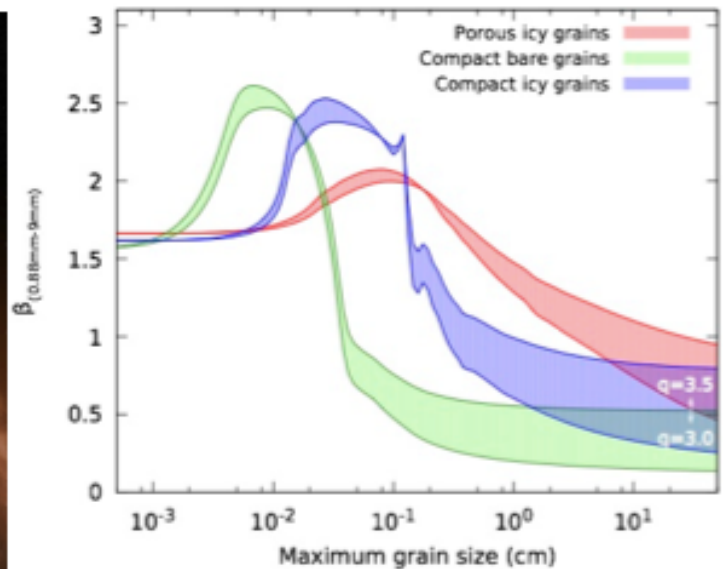
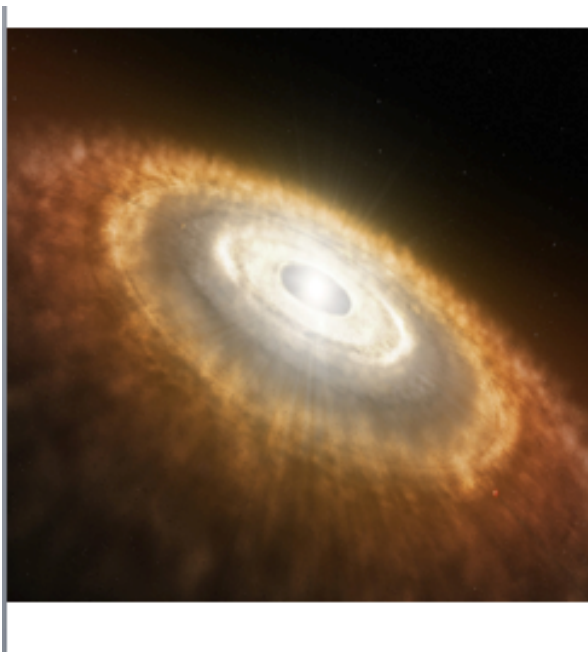


**AST 300B – Spring 2018**  
**In-class Problem Due: Monday Feb. 19**

22. Consider an optically thin dusty disk surrounding a young protostar with luminosity  $L_{\text{star}}$ . In this problem, you will derive how the temperature of dust grains varies with distance from the star.

(a) Assume the dust opacity at long wavelengths is given by a power-law  $Q_{\text{abs}} \sim \nu^\beta$ . Derive the dependence of  $T_d$  with  $r$  and  $\beta$ .

(b) In typical ISM dust  $\beta \sim 2$ , but in protostellar disks where dust grain start to grow into planetesimals a more typical  $\beta \sim 1$ ; what is the power-law index of  $T_d$  with  $r$  for the  $\beta \sim 1$  found in disks?



Testi et al. 2013 PPVI Review