## Exercise 1

Given an observation in the RJ-tail of an unresolved grey-body optically thin dusty source such as a star forming region, explain how we can relate the observed flux density to the dust mass or the object luminosity.

Exercise 2

For a starburst with constant star formation since some time 0, outline how the observed total infrared-luminosity, LIR, or equivalently the total bolometric luminosity, can be related to the star formation rate. Consider this as a function of the shape of the initial mass function and the starburst age. How does the luminosity evolve in time? How does this differ between a continuous starburst and a short (delta-function) starburst? Explain Fig.3 (see right) from Omont et al. 2001, A&A 394, 391.
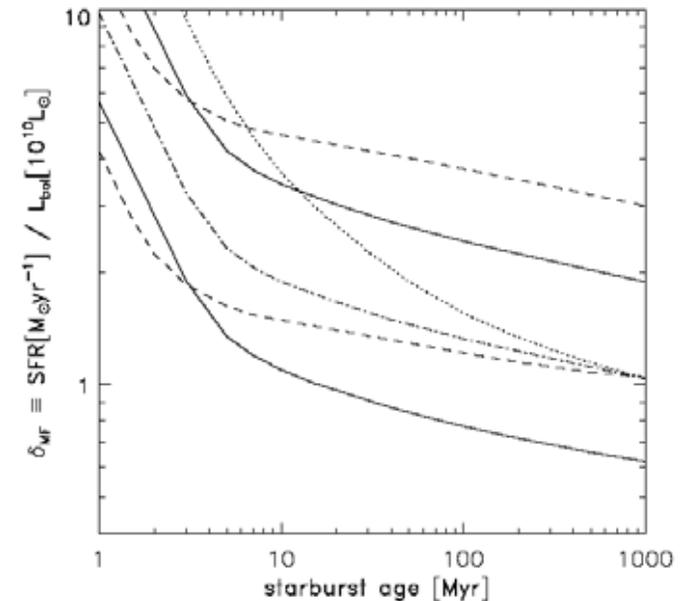
Additional information you may or may not need: (stellar masses in M_{sun})

lifetime of a star as function of mass: $t/Myr = 2.7 + 171M^{-1.13}$
cf. Maeder & Meynet AA 210, 155 (1989), Table 2

Lyman-continuum flux: $S_{lyc} = 4.8e45 \ M^{2.17}$ for 40-120M_{sun}
                  $= 3.9e42 \ M^{4.11}$ for 20-40 M_{sun}

Mass-Luminosity relation: try your own fit from:
$M / \log L$ = 20/4.625,30/5.082,40/5.361,60/5.717,80/5.947,100/6.120
(search values for lower M, see works of Maeder & Meynet, e.g.)

Use Initial Mass Functions shown in lecture notes.

Additional optional task: follow Lyman-continuum flux or SN-rate as a function of time.