What do we want to learn, and why?

- About Dust:
  - dust temperature(s) → luminosities → masses (in different phases?)
  - dust optical depth at different wavelengths
  - dust composition(s) - either broad brush (i.e., PAHs vs Silicates, or more complicated?)
  - dust spatial distribution
  - extinction/attenuation curves
  - evolution of these properties with redshift
- About other things that dust affects:
  - stellar mass
  - spatial distribution of mass
  - mean stellar age
  - star formation rates
  - star formation histories
  - intrinsic AGN properties
- Are we inferring physical parameters? when are semi-empirical correlations enough? (e.g. how literally should we take Mdust, T, beta, …)

i.e., What can we realistically learn?

What do we need to improve?

- Data
  - Spectra? Sensitivity? Spatial resolution? *Polarization?*
  - How can we improve templates/models to represent diversity of objects, such as scatter of galaxies about average IR SEDs?
- Models & Simulations
  - Galaxy formation/evolution models with some proper treatment of dust (e.g., formation, growth and destruction by various process, realistic dust distributions around young stars and AGNs)
  - dust-starlight interaction (radiation transfer through the actual ISM, effect on the effective attenuation, etc.)
  - Constraining Kappa (emissivity) and beta (emissivity index)
  - Comparisons between models/simulations and measurements
  - Better modeling of geometry of dust and stars, proper radiative transfer, to better compare to data
  - How the opacity of dust varies with environment?
  - Understanding physical parameters from data-model comparison
  - How to deal with degeneracies?