Nucleation, coagulation, clustering processes, photolysis, formation and desorption of ices: Impact on ISM and protoplanetary disks

- Dust nucleation: what is the nature of the carbonaceous grains produced in evolved C-rich star envelopes and injected in the ISM?

- Accretion and coagulation in the ISM:
  - To what extend dust coagulation and growth participate to the variation of the cold dust FIR emissivity observed in diffuse and dense ISM? Can it be constrained?
  - Can we distinguish carbon mantle growth on silicate and/or carbon grains vs coagulation of silicate and carbon grains?
  - How efficient are the 2 processes? Are they compatible with dust destruction timescale in the ISM?
  - Coagulation & coreshine: is coreshine an observational evidence of grain coagulation and/or accretion?

- Ices:
  - Are the non-thermal desorption processes fully identified (by observations) and characterized (in the lab) ?

  What are the signatures (*velocities ? Internal energy ? ortho-para ratio in pprotoplanetary disks ?)*

  - Are the photodesorption rates measured for pure ices in the laboratory relevant to astrophysical media ? What are the most critical species for which the photodesorption rates need to be known with accuracy ?

  - Is the wavelength-dependence of photolysis important for astrochemical models? What do we know about ice photochemistry versus photodesorption ?

  - How non-thermal energetic processes can desorb intact complex organics species?