Wrapup & Action items

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Path to August Meeting

- Next face to face: Tuesday & Wednesday August 16 & 17, 9-5 PM each day
- Great science ideas are emerging and should continue to be discussed to formulate killer app proposals from each sub-group.
- No limit to the number of killer apps, but think on general statements or themes with supporting specific projects.
- Action to Meixner & Cooray: create a common form for each proposed killer app-Deadline May 20
- Action to Meixner, & Cooray: To develop a process for the selection of killer apps and distribute to STDT
- Every two weeks there will be an STDT telecon to discuss progress on STDT science sub group killer app proposals: Meixner & Cooray will develop a schedule of subgroups.
- Deadline for killer app proposals is Friday July 29 (11 weeks from today)
- Some specific homeworks from discussion follow…

Possible killer apps

("musts"?; can we convert these to killer questions?)

- Tracing the ingredients of habitable worlds:
  - Alt: investigating the building blocks of habitable planets
  - Tracing the dust and gas content of "solar nebulae" from the birth of proto-planetary disk to the formation of planetary systems
  - Origin of Earth's water: A census of D/H in 100s of comets and TNOs (plus C,N,Os+). *[- follow-up of LSST comets?]*
  - *Focus on water – contain other volatiles, NH3 (Klaus)*
  - Census of total water content for 1000s of proto-planetary disks. *- can separate warm, ice and snow-line with FIR only.*
  - *Do a wide range of stars, M-dwarfs to solar mass*

Possible killer apps

("musts"?; can we convert these to killer questions?)

- Characterizing Jupiter and Saturn analogs:
  - *CO2 – cool planets*
  - *NH3 Jupiter types*
  - *Characterization of cool planets – 300K area. Other methods get hot things.*
  - *Using disk structure to count planets. WFIRST will do a microlensing survey and get statistics. Additional room?*
  - *Debris disk looking at younger ones?*
  - *Spectroscopy/direct imaging….*
  - *mid-IR characterizing greenhouse effect in extrasolar planets*

Possible killer apps

("musts"?; can we convert these to killer questions?)

- Galactic to nearby galaxy work:
  - Time variation of mass accretion across the Galactic plane.
    - not clear if this is helpful scientifically for SF
  - Total energy budget of the galaxy.
  - Energy of the ISM.
  - Magnetic fields and polarization.
    - [to other groups: polarization sciences?]
  - SF as a function of environment.

Possible killer apps

("musts"?; can we convert these to killer questions?)

- From gas to stars and blackholes: growth and evolution of galaxies over the full cosmic history. *[FIR can do BHs and SFRs at the same time! - aim more on Milky Way-like at z=1,2,3,4,5]*

  - *Connect galaxies from local universe to formation epoch.*
  - *Not a JWST – JWST will get stellar mass.*
  - *WFIRST – Halpha/Hbeta –*
  - *Spectroscopy, PAH, OIV, Ne, S,…. -*

Possible killer apps

("musts"?; can we convert these to killer questions?)

- Beginnings of Chemistry: the formation of heavy elements,dust and molecules. *[not sure what the exact observable here is?]* The epoch of dust formation in the Universe…
  - *JWST followup? This is not a JWST topic. JWST will provide targets.*
  - *What are z=10 JWST-detected galaxies?*
  - *Density, metallicity. SFR, ….*
  - *Dust molecule – ALMA; PAHs. Unique for FIR.?*
  - *Angular resolution needed to separate JWST-detected galaxies*

Possible killer apps

("musts"?; can we convert these to killer questions?)

- Detecting the first galaxy formation sites via H2 cooling during the cosmic dark ages. - *[pushes beyond JWST]*
- *Homework – to do the calculations related to H2 and HD.*