Inflation Probe Systematics Working Group Kickoff Telecon

Jul 12, 2017

Inflation Probe study overview

- Probe class mission means < $\$10^9$
- NASA Astrophysics Directorate selected a number of Probe-class concept studies, kicked off around February 2017
  - Meant to inform 2020 Decadal Survey panel of interesting science that can be done with this class of mission
  - Shaul Hanany is PI leading team to develop science and technical case:
    - most of activity is happening on volunteer-basis working groups (such as this one!)
    - There will be 2 workshops: October 2017 Foregrounds workshop, Spring 2018 CMB science from space workshops
  - In parallel, NASA also sends funds to JPL to create spacecraft/instrument designs for a more accurate estimate of cost. Amy Trangsrud leading this.
  - NASA will also do an independent cost estimate

- Final report (50 pages) due at the end of calendar year 2018

Inflation Probe Systematics

- Goal: create a convincing case that the Inflation Probe science goals can be achieved in the presence of systematic errors
- In our proposal we said we would list sources of systematics, evaluate their magnitude (in some cases through simulation), and explore their mitigation.
- Questions to consider:
  - What is the best way to proceed given limited time/resources?
  - How to best leverage and to be complementary to ongoing work? In particular S4, LiteBird, CORE.. And any other relevant sub-orbital activity

Suggested plan

1. ~ Sept 15: build preliminary systematics table
   - Review previous work on systematics:
     - Gather together in a succinct way what we know about the L2 environment and large scale polarization challenges from Planck
     - Gather relevant studies from CORE, LiteBird, S4.. Any other relevant suborbital work
     - Gather studies of PIXIE/PIPER (Inflation Probe may include a spectrometer)
   - Estimate magnitude and possible scaling laws for a generic space mission
   - Possibly focus on very low ell: maximize benefit
   - Determine whether some categories may need deeper / more intensive simulation is needed and how to implement these
   - Think about which key trades we need to look at: for example fast modulator or no fast modulator
   - Finally..Review with wider Inflation Probe team
2. At one of the workshop (maybe the spring 2018 one?) include a session on systematics
   - get feedback from an even larger audience
3. As JPL instrument/spacecraft design sessions proceed Fall 2017: start to build final systematics table
   - Preliminary systematics table / infrastructure to inform the designs
   - update systematics tables given the reference instrument/spacecraft designs
   - Plan implementation of any heavier simulations (funding/resources allowing)
4. Be ready with ~final results by the time writing commences (summer 2018)