Inflation Probe Mission Study

Aug. 22, 2016

Background

- NASA issued a call for proposals for probe-scale space mission studies
- Probe-scale is $400 - $1000M
- Part of NASA's planning for the next decadal panel
- Report of mission study will be presented to the decadal panel for prioritization
- There will be a total of 5-8 probe studies
- This is not a project to build a specific spacecraft

Key Facts

- Probe Scope: $400M - $1000M
- Study Duration: 18 months
- Selection + Start: 2/2017 + 3/2017
- Study Funds: $100K - $150K + cost of design studies and final mission cost assessment
- Proposal length: up to 15 pg
- PreProposal Telecon: Sept. 13, 2016
- Proposal Due (NOI): Nov. 15 (Sept. 16)

Why Conduct a Study?

- NASA has played a major role in CMB Measurements.
- It has supported technology development extensively and balloon-borne experiments.
- NASA was not part of DOE's P5 prioritization process.
- NASA only supports activities that are associated with a potential future space mission.
- NASA needs a plan for the decade.
- This is the best vehicle to ensure that NASA continues to support CMB as a priority.
- This would be the best vehicle to be considered for a probe-scale mission should NASA establish the funding wedge.

What did we do for Decadal2010?

- 3+1 workshops
  - Theory (Fermilab; Dodelson + ?)
  - Systematics (Annapolis; Hinshaw + Ruhl)
  - Technology (Boulder; Hanany + Irwin)
    - Summary: “The Path to CMBPol: Upcoming Measurements of CMB Polarization” (Chicago; Meyer + Pryke)
- Produced a number of science + technology community white papers, and a 25 pg. final report
- Recommended to support technology development + balloons, and wait for hints of inflation from sub-orbital expts.

What will we study? What might we propose?

- A Space Mission
  - Set requirements: r<=0.001 (??); 2<\ell<?? ; self CMB delensing or rely on S4/CIB; non-inflation science; 30(?) < \nu < 600(?) GHz; Spectrometer? Imager? Both?
  - Design the instrument + produce cost estimate.
- A Plan for the decade
  - Complementarity with S4.
    - what is the appropriate \ell & \nu overlap
  - Do we push for a space mission, or wait for hints from sub-orbitals
  - How important is it to continue the support for balloon measurements?
  - What is NASA's role in technology development in the 2020s? Does it have any role in S4 if/when it is funded?

Science Requirements

Instrument Design

Open Workshop: 'Space/Sub-Orbital Complementarity in the 2020s'

Science Requirements

Space/Sub-Orbital Complementarity

Instrument Design

Proposal Writing

- Need writers/reviewers for sections of the proposal (outline is next page)

Proposal Outline

- Theoretical review
    - including challenge of foregrounds
- Current and forthcoming Experimental Efforts
    - including ground, balloons, S3, S4,
- Why a satellite?
    - including lightbird, core, pixie
- Proposed work
    - Set mission requirements for imager and spectrometer
        - Do forecasting for science and analyze foregrounds
    - Propose strawman design with/out a spectrometer
    - Detail the technical challenges and give path to TRL6
    - Organize workshop to study complementarity with sub-orbital efforts

Additional Slides