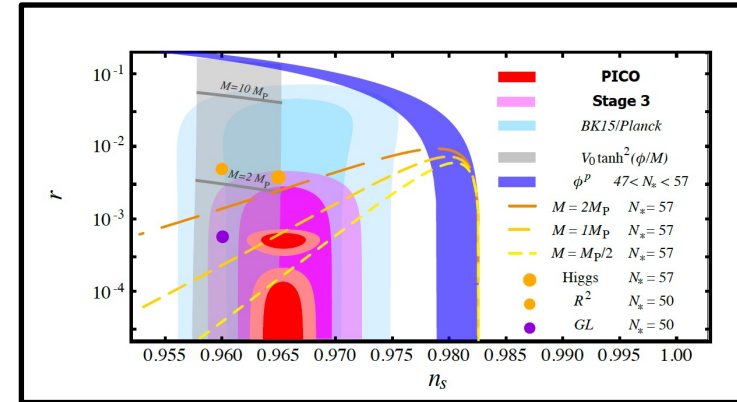
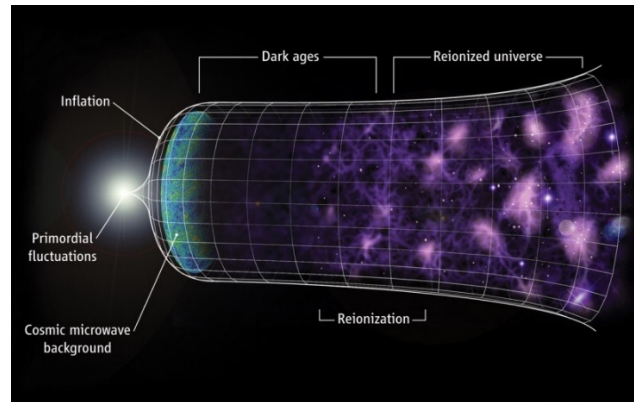
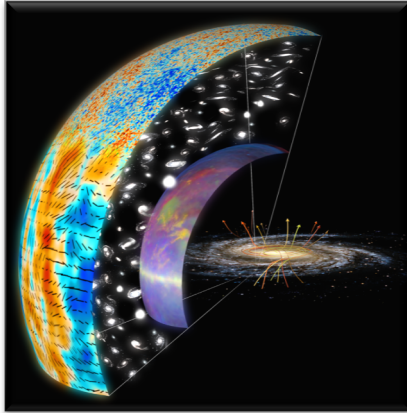


Inflation Probe Science Interest Group Update

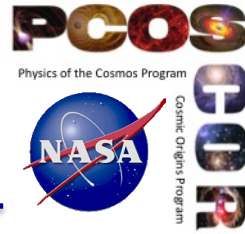


Graça Rocha

Jet Propulsion Laboratory/Caltech
Chair Emeritus, Physics of the Cosmos Program Analysis Group, PhysPAG
Co-Chair, Inflation Probe Science Interest group, IP SIG

graca.m.rocha@jpl.nasa.gov; graca@caltech.edu

IPSIG - Inflation Probe Science Interest Group



<https://pcos.gsfc.nasa.gov/sigs/ipsig.php>

Goal: to provide quantitative metrics and assessment to NASA in regard to a future Inflation Probe mission. Specifically:

- Review and update mission science goals following current developments in the field (e.g., **Planck**, **sub-orbital** measurements),
- Review and update information about and requirements on potential foreground contaminants and their removal,
- Review and update requirements on and developments in control of systematic errors,
- Assess necessary technology developments and prioritize areas for increased technical emphasis.
- Organize mini-symposia at the AAS and APS meetings to present updates of IPSIG related activities and participating in relevant meetings (as is the case here)
- Facilitate community organization of white papers and Decadal Survey inputs

The IPSIG is open to all members of the community. If you are interested in contributing to the work of the IPSIG, please subscribe using the webpage above. For other inquiries, e-mail **Co-Chairs:**

Kevin Huffenberger

khuffenberger@fsu.edu

Graça Rocha

graca.m.rocha@jpl.nasa.gov

IPSIG - highlights and updates

☐ IP SIG

- Main activity of community during 2019 was the production of ~ **20 Science whitepapers** and **8 APC whitepapers** for Astro2020 decadal
For information on the SWP please take a look at the IP SIG webpage

Participation of IPSIG Co-chairs in the PhysPAG EC activities - these include recent Cross-PAG activities around the following topics:

- **Cross-cutting Technology** – organization of a Joint Technology Session at a future winter AAS meeting with emphasis on technology development that could be cross-cutting
- **Data analysis frameworks and transferability** - Is there a specific analysis the PAGs could do that would be useful to NASA HQ and so help motivate a SAG?
- **NASA Science at Under-Served Institutions** - Engagement in NASA astrophysics research from under-represented groups

IPSIG – Science White Papers

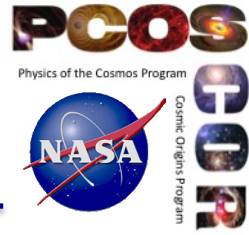
<https://zzz.physics.umn.edu/decadal2020/doku.php?id=start>



- Primordial Gravitational Waves and Inflation
- Light Relics (Neff, BBN Abundances)
- Neutrino mass
- Dark Matter (focus: CMB/21-cm probes of DM interactions)
- Dark Energy and Modified Gravity
- BBN
- Primordial Non-Gaussianity
- Reionization
- Galaxy Cluster Feedback & Thermodynamics
- CIB and Star Formation
- Cluster Cosmology
- Galaxy clustering & growth of structure [Legacy Catalogs]
- Extragalactic radio sources
- Polarization of extragalactic sources
- Galactic Science
- Mapping Dark Matter on Small Scales with ultra-deep, high-resolution CMB measurements
- CMB Summary
- Summary of non-CMB Science from CMB Surveys
- Gravitational Probes of Ultralight Axion Dark Matter

<https://baas.aas.org/astro2020-science>

IPSIG - highlights and updates



☐ IP SIG

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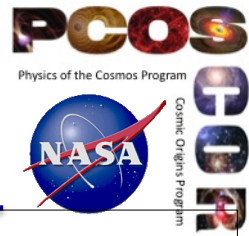
– APC whitepapers:

- 3 related explicitly to space-based projects: **PICO**, **LiteBIRD**, and description of a program for **CMB spectral distortions**
- Others related to technological development or ground-based projects (Ground-based efforts highly complementary to space based efforts)
- 1 paper, “The need of better tools to design future CMB experiments”, has a sub-section dedicated to space vs ground complementarity

<https://pcos.gsfc.nasa.gov/sigs/ipsig.php>

<https://baas.aas.org/astro2020-apc>

IP SIG - highlights and updates



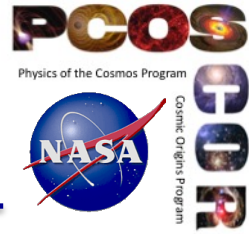
□ IP SIG

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https://pcos.gsfc.nasa.gov/physpag/meetings/AAS_Jan2021/AAS2021-Meeting.php

IPSIG - highlights and updates



☐ IP SIG - Organized a session at AAS January 2021 - Virtual Meeting

Inflation Probe SIG

Wednesday, 13 January 2021, 12:00 Noon

Chair: Kevin Huffenberger

Video recording [[MP4 Video](#), 134MB]

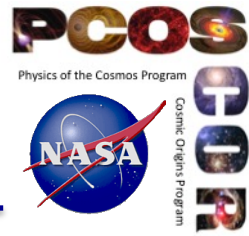
Agenda

- **IPSIG Overview** [[PDF](#)] – Graça Rocha, JPL/Caltech (15 + 5 mins)
- **PICO Overview** [[PDF](#)] – Shaul Hanany, University of Minnesota (15 + 5 mins)
- **CMB-S4 Overview** [[PDF](#)] – Julian Borrill, LBL (15 + 5 mins)
- **Complementarity of Space and Ground-based Experiments** [[PDF](#)] – Charles Lawrence, JPL (15 + 5 mins)
- **Discussion** (10 mins)

➤ Current goals

- Continue organizing sessions and engage the community
- Prepare for Decadal outcomes

IPSIG - highlights and updates

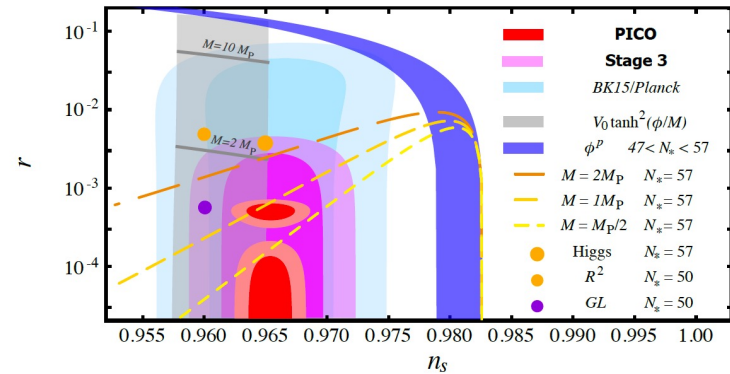
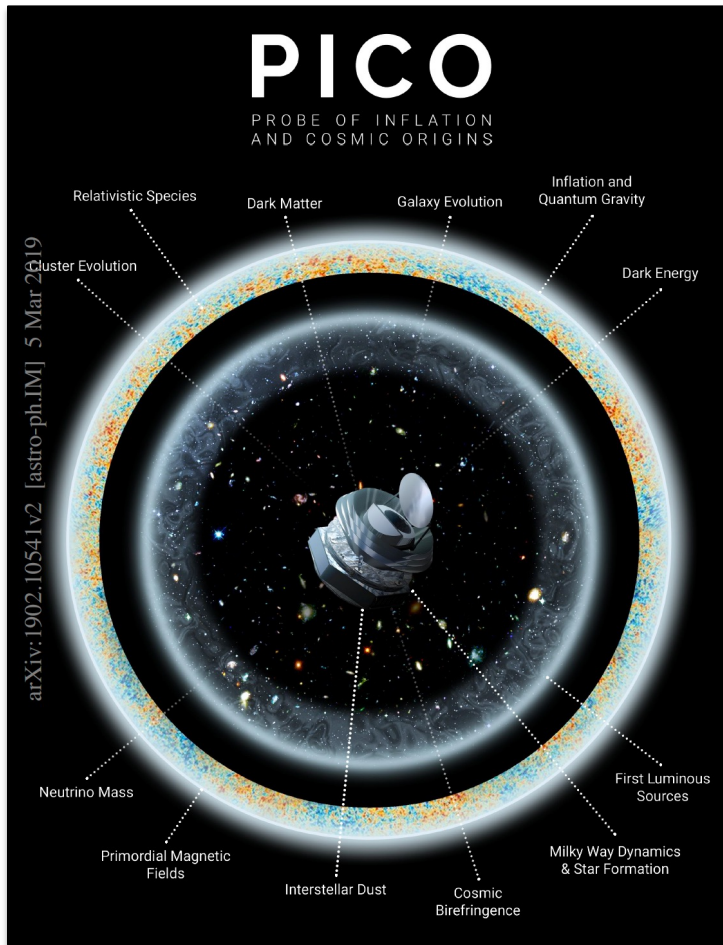


It's a exciting time for Inflation-probe science

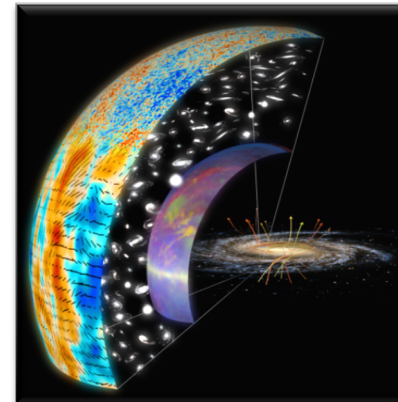
Waiting for the Astro2020 decadal survey recommendations

Final report delivered to NASA and Astro2020

PICO APC paper

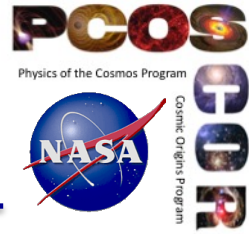


KISS study: *Designing future CMB experiments*



Several White and APC papers

IPSIG Meetings and Activities



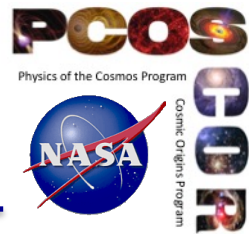
- AAS (Virtual) meeting, January 2021
- **APS (Virtual) meeting, April 2021 – this meeting!**
- AAS (Virtual) meeting, January 2022

Inflation Probe SIG Minisymposium

Sponsoring Division: DAP

When: Sunday 18 April, 1:30 PM Eastern (Session K21)

Chair: Kevin Huffenberger (Florida State U.)



Agenda

- 1:30– Graça Rocha (NASA JPL) – Inflation Probe SIG Overview
- 1:37
- 1:37– Shaul Hanany (U. Minnesota) – Science Reach of PICO – a New, Probe-Class CMB
- 1:53 Space Mission
- 1:53– Adrian Lee (UC Berkeley) – LiteBIRD Overview
- 2:09
- 2:09– Al Kogut (NASA GSFC) – The Primordial Inflation Polarization Explorer (PIPER):
- 2:25 Testing Inflation on Large Angular Scales
- 2:25– Jeff Filippini (U. Illinois) – The First Flight of SPIDER: Probing Inflation from the
- 2:41 Stratosphere
- 2:41– Discussion
- 2:46
- 2:46– Mathieu Remazeille (U. Manchester) – Forecasts on Foregrounds Removal and
- 2:53 CMB B-mode Recovery with the Probe-class Mission Concept PICO
- 2:53– Rahul Datta (Johns Hopkins) – The Primordial Inflation Polarization Explorer
- 3:00 (PIPER): Characterization of the Receiver and Detector Arrays
- 3:00– Johanna Nagy (Wash. U. St Louis) – Foreground Component Separation for
- 3:07 SPIDER's Primordial B-mode Constraint
- 3:07– TBA – LiteBIRD related
- 3:14
- 3:14– Discussion
- 3:18

Today's session