

# Polarimeter to Unify the Corona and Heliosphere

## PUNCH Associate Investigator Program

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# WHAT IS THE PUNCH SMALL EXPLORER MISSION?

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**Scientific Driver:** Understanding how the corona gives rise to the heliosphere and solar wind

**Approach:** direct, continuous, 3D imaging of the entire outer corona and inner heliosphere

**Measurement:** polarized images of Thomson-scattered light

**Mission structure:**

- four synchronous smallsats
- 570km sun-synch LEO
- two year duration; launch ~Q4 2023

**More information:**

<https://punch.space.swri.edu>







# Three Scales of PUNCH Outreach



*Youth and families:*  
PUNCH Outreach Program  
brings scientific engagement  
to underserved populations,  
concentrating on the  
American Southwest.  
(scale: thousands to millions)

*Undergraduates:*  
STudent Energetic Activity  
Monitor (STEAM) instrument  
program engages college  
students via the Colorado  
Space Grant Consortium.  
(scale: ~100)

*Early-career PhD scientists:*  
PUNCH Associate Investigator  
program recognizes early-career  
scientists relevant to PUNCH, and  
encourages enhanced PUNCH  
mission science.  
(scale: ~10)



# The PUNCH Associate Investigator program

- **Motivation:**

- *Successful missions tend to have a handful of early-career scientists who take the mission “above and beyond”.*
- *Fostering that dynamic is difficult in the proposal stages, where established scientists are named as Co-Investigators.*

- **Method:**

- *During early phases, identify potential “super-performers” helping the science team.*
- *Recognize super-performers and explicitly add them to the science team.*

- **Benefits:**

- *Provide explicit recognition to early-career scientists, boosting PUNCH engagement.*
- *Open a potential “on-ramp” to funded positions closer to launch.*
- *Improve science team performance.*
- *Foster more age-diverse group dynamics earlier in the mission (Phase B/C/D).*

- **Timing:**

- *Program began late in Phase B; first AIs announced late April 2021.*



# What is a PUNCH Associate Investigator?

- **Early-career:** within 10 years of PhD conferral
- **PUNCH-relevant:** performing research of relevance to the PUNCH mission
- **Talented:** identified by the PUNCH science leadership as exceptional
- **Full science team members:**
  - Invited to STMs and working group meetings
  - Acknowledged on the PUNCH website and elsewhere
  - Included in science and science-planning activities
  - Mentored by existing PUNCH Co-I's
  - Liaison with broader science community (two-way communication)
- **Unfunded:**
  - Associate Investigators are not specifically funded by PUNCH at this time.
  - Associate Investigators *may* be funded in future (with NASA approval).





# How are Associate Investigators chosen?

- **Process:**

- Potential Associate Investigators are identified by existing Co-Investigators.
- Sponsoring Co-I/Mentor drafts a letter of recommendation to the Project Scientist.
- Project Scientist evaluates both the candidate and the CO-I, and recommends to PI.
- PI approves the candidate as an Associate Investigator.

- **Process design considerations:**

- Recognize and reward talented “rising stars”
- Build age diversity on the PUNCH team
- Include “tuned” roadblocks:
  - Not everyone can be a PUNCH Assoc. Investigator (title needs to be a mark of distinction).
  - It should be straightforward (and non-onerous) to induct folks with clearly recognizable talent.



# Metrics of success

- **At initial scale (4 AIs), the program is measured informally**
  - Anecdotal feedback from Co-Is on productivity
  - 6-month feedback request for first batch of AIs (planned)
- **Longer term AI program metrics:**
  - Semi-annual questionnaire feedback from AIs and from mentors
  - PUNCH publication count with AI involvement
  - Transition rate to PUNCH-relevant funded positions



# Lessons learned so far

- **This young program *seems* to be working as intended (at least initially)**
  - “PUNCH AI” has strong meaning; gives recognition & legitimacy
  - New viewpoints are showcased at science meetings & elsewhere (increasing team diversity)
  - CO-I – AI mentorship cements existing relationships
- **Do not name your program “AI”.**
  - “AI” has too strong a meaning in the machine-learning milieu (already the source of puns!)
  - We will consider (in consultation with the existing AIs) changing the name of the program.
- **Finding a way to fund Assoc. Investigator programs up front would be helpful.**
  - Assoc. Investigator program is not part of the PUNCH baseline funding.
  - *Could* be a use for unused reserves (with NASA approval), a bit farther through Phase C/D.
    - Process provides funding later in the mission than I would like, and does not provide certainty to AIs.
    - It would be imprudent to release reserves too early in development; especially with COVID-related uncertainty and supply chain issues now and on the horizon.
  - Future missions: maybe set aside a fraction of science budget for AI-like programs?