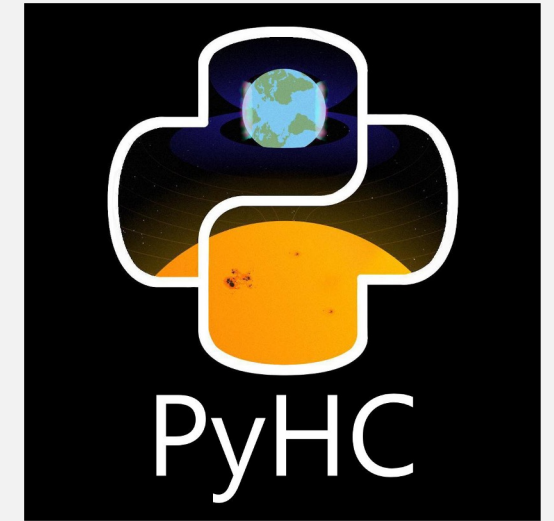


# PyHC: a solution for open-source software needs within Heliophysics

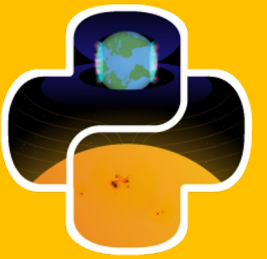


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**Julie Barnum**

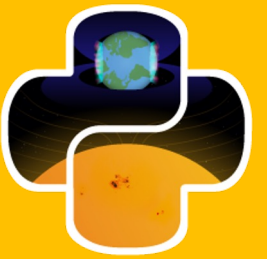
LASP | University of Colorado Boulder

4th Eddy Cross-Disciplinary Symposium, Golden, CO, November 1, 2023



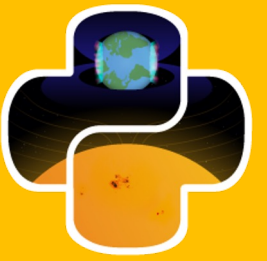
# PyHC Background

- Who we are
  - Promoting and facilitating the use and development of Python for Heliophysics.
  - A community knowledge base for performing heliophysics research in Python, aiming to provide a variety of tutorials, resources, a list of useful packages, general discussion, and advice.
  - [pyhc.org](http://pyhc.org)
- Projects
  - Core projects: PlasmaPy, SunPy, pySPEDAS, SpacePy, pysat, **Kamodo**, **HAPI**
  - Other widely-used projects
  - Un-evaluated projects
- Domains
  - Science: Solar, Heliospheric, Geospace Sciences (Magnetosphere), and ITM
  - Software Capability: Modelling, ML, plotting, wrappers for other libraries, CDF writers, etc.
  - Mission software: db-processing, CCSDSpy, space-packet-parser

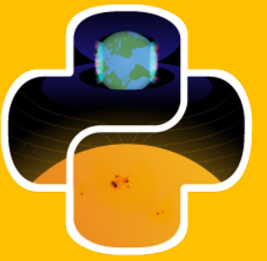


# PyHC Background

- Bi-weekly telecons
  - Project intros/updates, continued discussions from meetings/past telecons, outside speakers
- PyHC bi-annual meetings
  - Out of cycle meeting in late Feb?
- Upcoming meetings
  - AGU 2023 in San Francisco, CA
    - SH33E - Implementations in Python for Solar and Space Physics Poster (Wed, Dec 13<sup>th</sup> 14:10 - 18:30 PM PT)
  - ADASS, AMS, TESS 2024, PyHC 2024 Summer School, software standards workshop (more info TBA), COSPAR's 45th Scientific Assembly

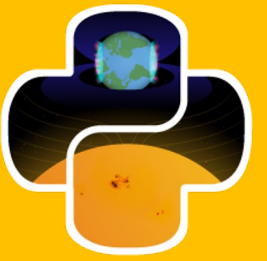


*Some* Upcoming PyHC Efforts...



# PyHC Virtual Environment

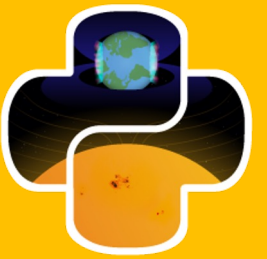
- End goal: all PyHC software bundled into one dockerized environment, installable from PyPI/Conda. Hits our goal of an interoperable environment!
  - Maintain on a regular basis
- Previous efforts resulted in the PyHC 2022 summer school container
- Spring 2023 meeting hackathon
  - Group condensed the allowable ranges of requirements into one PIP-installable "requirements.txt" file (Python virtual environment)
  - "import-test.py" file created that imports every PyHC package
  - Successfully ran on Mac OS, with efforts to improve problems with Windows!
  - **BIG moment of success for PyHC** 🎉
- Docker images that use this new PyHC environment available on Docker Hub
- In the beginning stage of integration with HelioCloud and ESA Datalabs



# PyHC 2024 Summer School

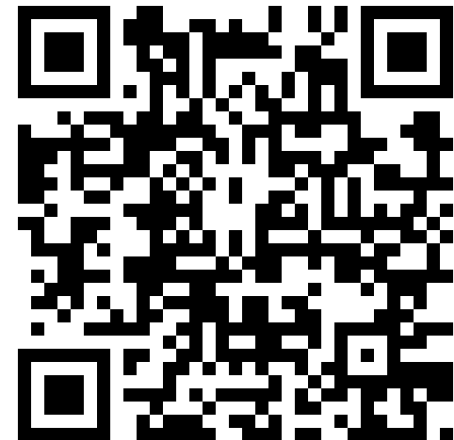
- What
  - *“Building upon the success of our inaugural event”*
  - Continue with package intros, with a deeper focus on integration and student involvement.
- Why
  - Educate students and early career scientists in the software capabilities available through PyHC, and get them involved in the community.
    - Ownership of these living package tools is community-driven!
  - Expose heliophysics researchers to cloud-based research approaches. (Serve as another big test of HelioCloud and updated capabilities.)
  - Improve PyHC as a whole.
    - Create a more diversified community.
    - Learn where our software/resource gaps are (encourage feedback from attendees for this).
      - Create collaborations to address gaps.
    - Motivate PyHC packages to continue working on package interoperability.

# PyHC 2024 Summer School



- Where: Laboratory for Atmospheric and Space Physics (LASP) in scenic Boulder, Colorado, USA
- When: Monday, May 20<sup>th</sup> - Friday, May 24<sup>th</sup> 2024
- Who: graduate students, early career scientists, and anyone eager to deepen their understanding of Python in the Heliophysics and Space Weather disciplines!
- What will this cost me?
  - **The event is FREE!**

*Check out the summer school's web page for upcoming details (e.g. registration link)!*



<https://heliopython.org/summer-school-24>



# Connect with PyHC

- PyHC website: <https://pyhc.org>
  - Upcoming telecon and meeting info on the Meetings page, PyHC packages info on Projects page, etc.
- PyHC YouTube
  - <https://www.youtube.com/@pythoninheliophysicscommun3732>
- Chat rooms
  - Element Chat:  
<https://app.element.io/#/room/#heliopython:openastronomy.org>
  - OR join our Slack (bridged to Element)
- PyHC mailing list (the most official way of “joining” that exists)
  - <https://heliopython.org/contact/>
- Further questions? Want to get your project added to the ecosystem? Drop me a line.
  - Julie.Barnum@lasp.colorado.edu



*Website*



*YouTube*



*Slack Invite*