

High Energy Astrophysics Software Futures (HEASwF) Working Group

Introduction

HEASARC has been directed in a letter from June 2024 to develop a plan to support the science community with software analysis tools for Chandra and Fermi data that HEASARC will maintain after the missions close out. This may include developing a new structure for analysis software to perform common tasks for X-ray missions and (potentially in a separate structure) for gamma-ray and particle astrophysics missions. HEASARC is directed to work with the Chandra and Fermi missions, and with the PhysCOS Chief Scientists and the PhysCOS office, to understand the needs of current and future X-ray, gamma-ray, and particle astrophysics missions, and to present a preliminary version of the plan to *APD*.

Working Group Plan and Structure

To implement this directive, a working group will be formed from volunteers from the community. A steering group made up of representatives of HEASARC, PhysCOS, Chandra, Fermi, and the cosmic-ray communities will select the members and leadership of the working group. This steering committee will continue to serve as an advisory board to the working group.

The main goal of the working group is to advise on the long-term plan for Chandra and Fermi software to be incorporated into HEASARC and scope the NASA HQ mandate: namely to advise the CXC, the Fermi, and the HEASARC teams in the short term on developing a software framework for future missions to use, and on a longer term to play a leadership role in the development of these high-energy astrophysics data analysis packages.

We envision the working group to be in place for an initial period of *one year*, with the working group advising on the next steps beyond that.

The working group shall advise on CXC, Fermi, and HEASARC analysis software plans at mission closeout and scope and advise on the direction of a software framework for future X-ray, gamma-ray and particle astrophysics missions by carrying out the following:

1. Consider the Chandra, Fermi, and HEASARC analysis software and the lessons learned from the teams that have maintained the systems over the last 30 years for analysis of high energy astrophysics data.
2. Advise on a path for Chandra, Fermi, and HEASARC analysis software at mission closeout.
3. Based on lessons learned and current software and technologies, inform a framework, outline a roadmap, and provide considerations to inform the development of a future data analysis package for high energy astrophysics.
4. Provide regular communication with the community through PhysCOS and splinter sessions at relevant meetings (e.g., AAS, HEAD, ADASS, IVOA) to both inform and gather input from the community.
5. Document the plans in reports to the steering committee and NASA HQ, with the goal of having input with effort estimates of sufficient fidelity to inform budget estimates, with an initial report at the end of 2025.

The working group leadership will be minimally a chair, deputy chair and an executive secretary to help with overall organization. Additional factors include:

- The working group leadership may establish several topical panels if warranted.
- The activities of the working group (software plans, meeting announcements and minutes, etc.) will be public on a working group web site hosted by HEASARC.
- Code, initially prototype or “minimum viable product” (MVP), that is developed by or coordinated through the working group will be open source and hosted on a public git repository.