# SDSS & Chandra Source Catalog + NHFP Report

**Paul Green, Dong-Woo Kim, Juan Rafael Martinez-Galarza, Raffaele D'Abrusco, Arnold Rots, Ian Evans & CatSci**

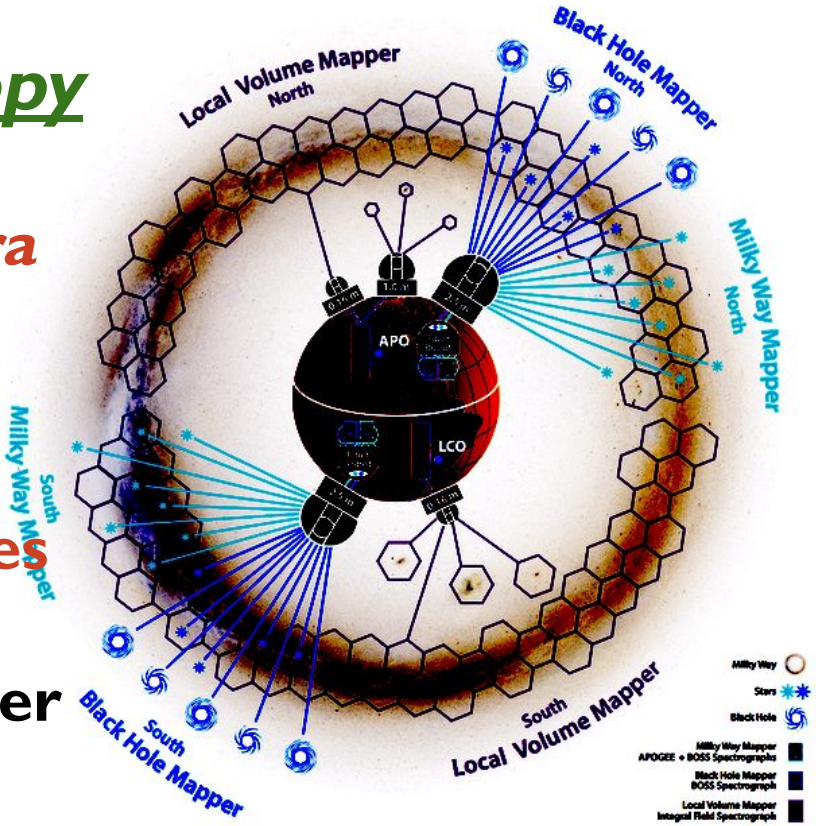
**for the Sep 2023 CUC meeting**

# SDSS-V 2020 - 2027 http://www.sdss.org/future

## *All-Sky Spectroscopy*

- ❑ **Black Hole Mapper**
  - *Repeat QSO spectra*
  - *eROSITA followup*
  - *r < 21.5 mag*
- ❑ **Milky Way Mapper**
  - **stars in IR at high-res**
  - ***H* <14 mag**
- ❑ **Local Volume Mapper**

**IFU of nearby galaxies**



# SDSS-V, SAO + CXC

- SAO joined SDSS-V as a full member: $230k/yr for 4 years
  Includes the 50% funds from the CXC

- CSC:
  - Only covers ~2% of sky
  - Much better sensitivity and spatial resolution than eROSITA!
  - ~50% have opt/IR counterparts with mag <21

- Stellar and XRB CSC counterparts in the Galactic Plane will be a unique treasure trove
- CXC will serve SDSS-V data products (spectral properties and flux-calibrated digital spectra) to the community (unfunded)

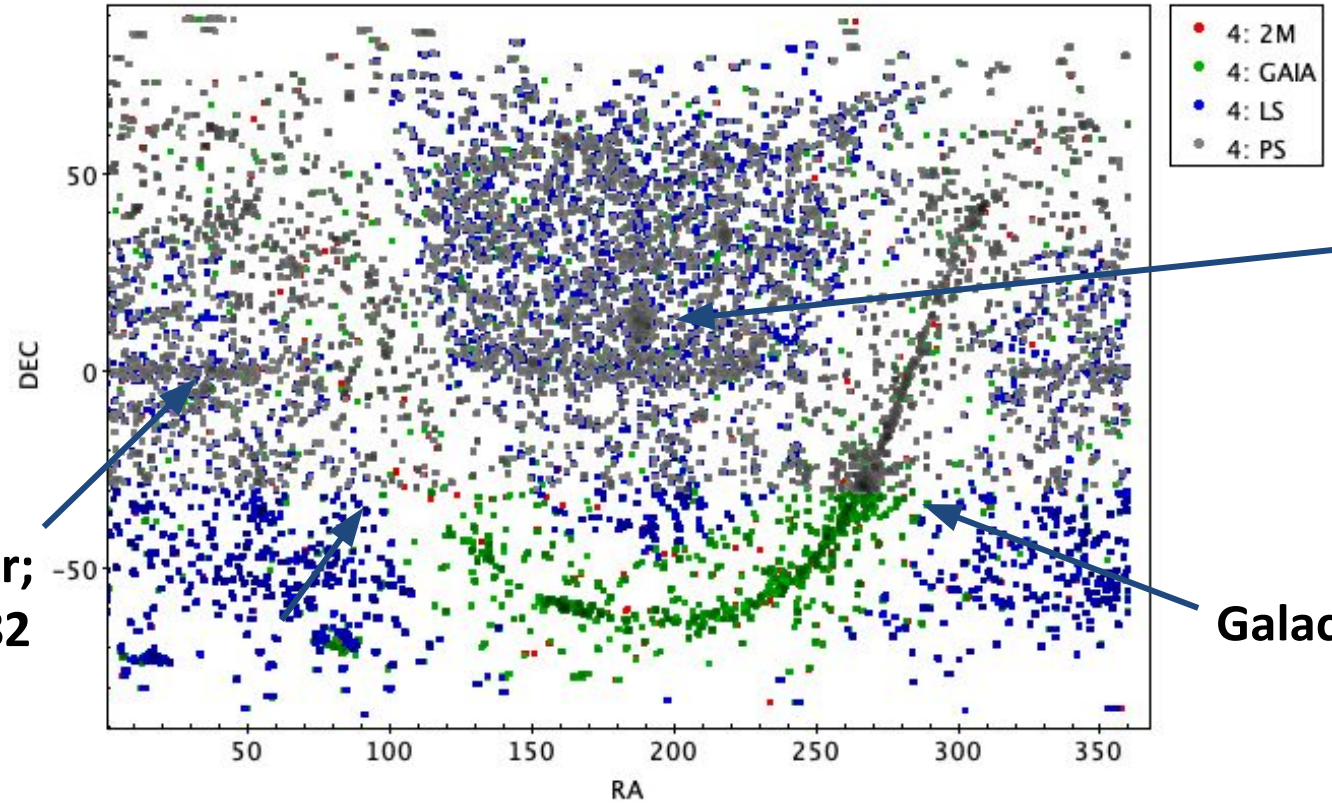
# CSC2.1p Opt/IR Counterparts: Targets for SDSS-V Spectroscopy

- Re-ran with CSC2.1p
- We only include for matching the following magnitude ranges

```
GAIA DR2  14 < G < 20
Legacy    14 < (g | r  | z) < 21.5
PS    14 < (g || r || i || z) < 21.5
2MASS H <= 14
```

- 188k total candidate targets (up from 148k) -
  - 172k optical; 16k IR only
- Include a priority Pri, derived solely from the X-ray S/N xsn.
- Targeting simulations say expect ~40k spectra (cf.~ 300k eROSITA)
- About ~10k new spectra to date from SDSS-V  (7k CSC targets)

# CSC Counterpart Targets for SDSSV Spectroscopy




Virgo Cluster

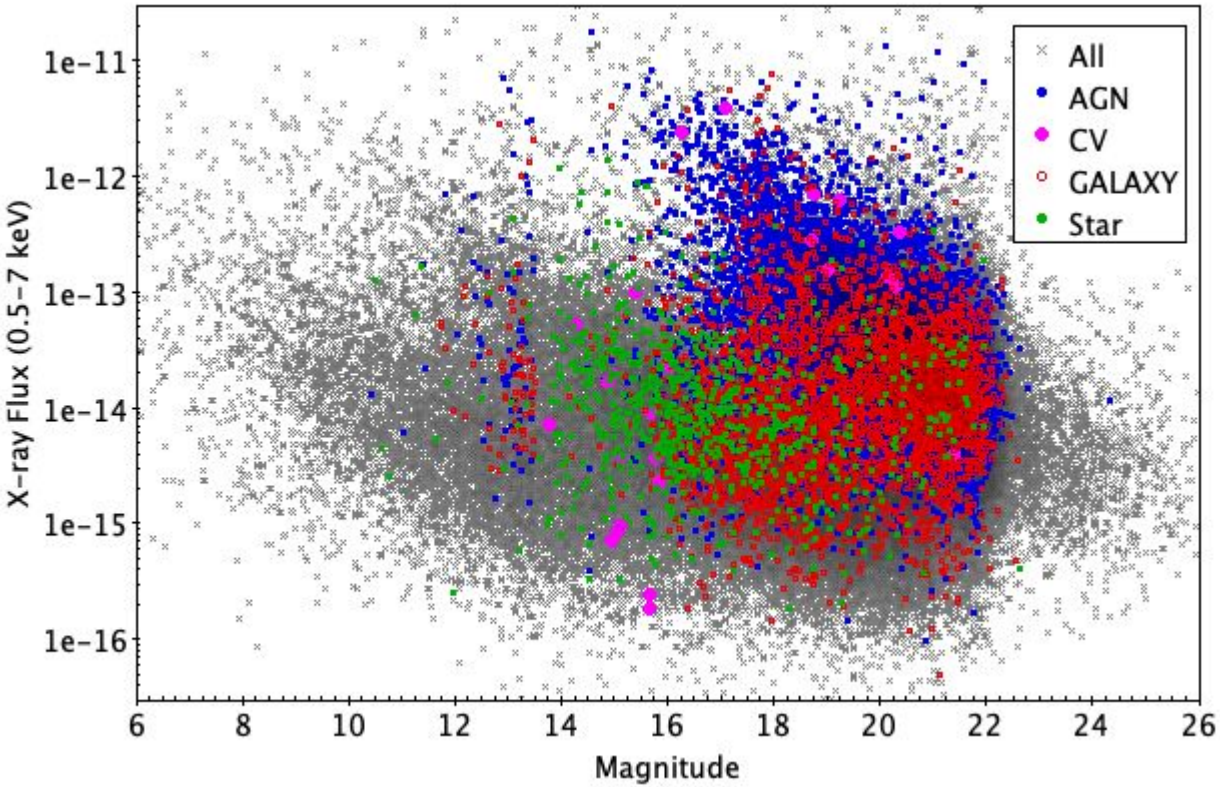
Equator; Stripe82

Galactic Center

# CSC2.1p Opt/IR Counterparts: and Public SDSS DR17 Spectroscopy

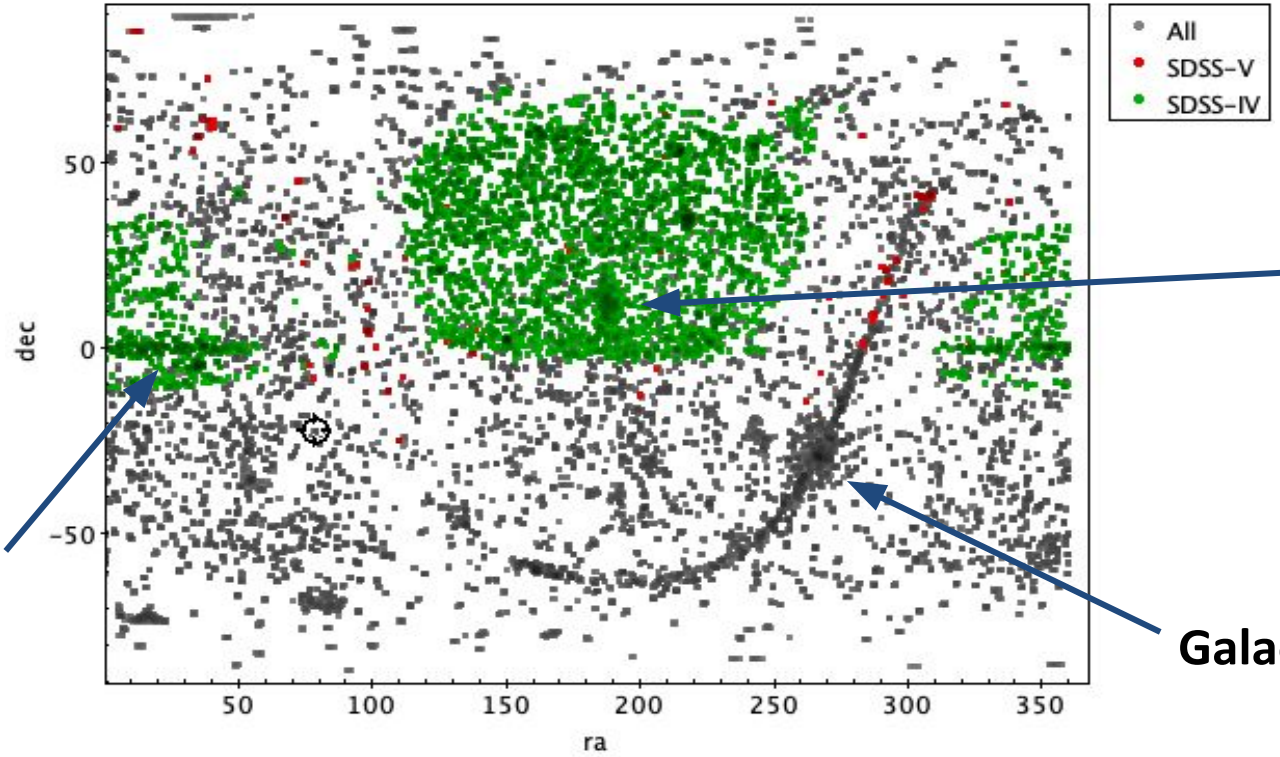
- A preliminary version of the Chandra Source Catalog v2.1 as of 2022 Nov contained 387441 unique Chandra X-ray sources.
- Matched to each of 4 opt/IR catalogs - Gaia DR3, PanSTARRS-1 DR2, Legacy DR10, and 2MASS using NWAY (Salvato, M. et al. 2018) with no mag limits imposed.
- 229,045 (~⅔) have an optical or infrared counterpart.
- Simple 3arcsec match between SDSS DR17 spectroscopy and X-ray position yields 17,666 spectra with `ZWARNING=0`
- 3,207 have `NSPECOBS>1`

# X-ray Flux vs Optical Mag with SDSS DR17 Classifications



# All SDSS/CSC Spectroscopy

## Equatorial Coordinates




Virgo Cluster

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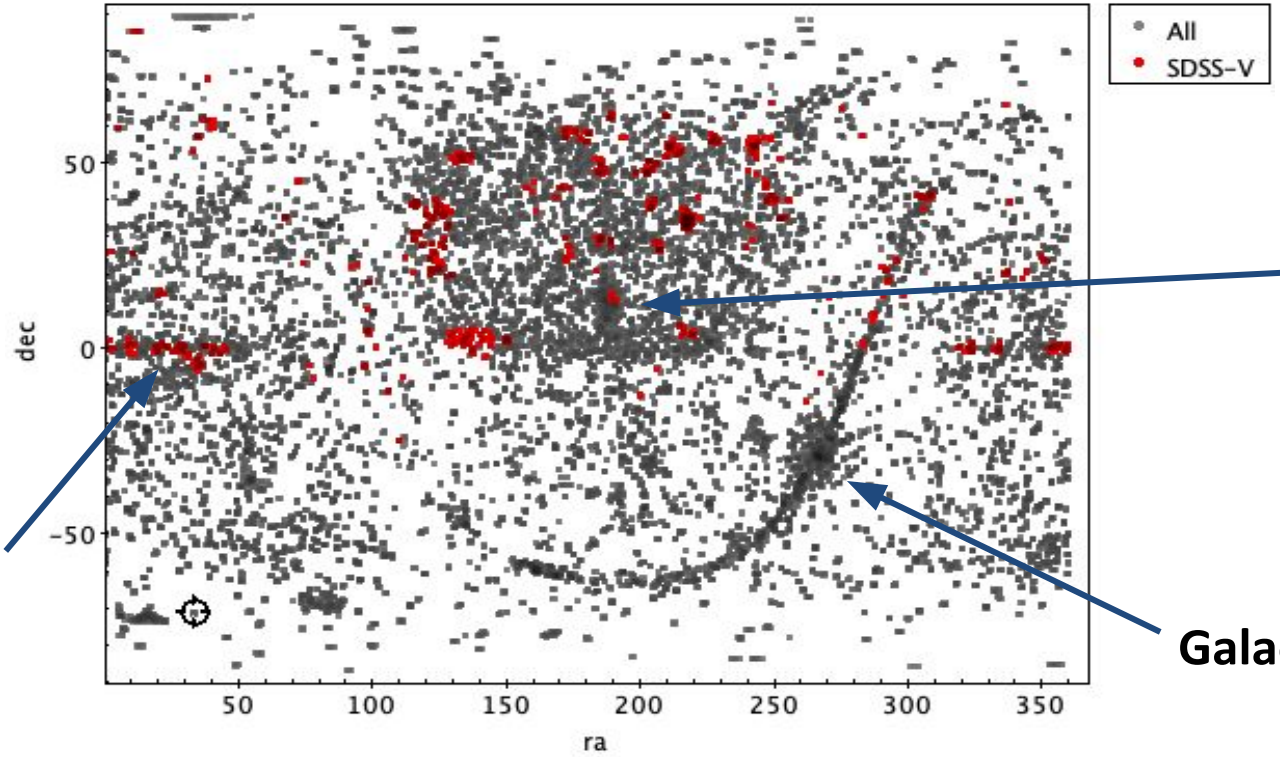
# SDSS-V/CSC Spectroscopy

## Equatorial Coordinates

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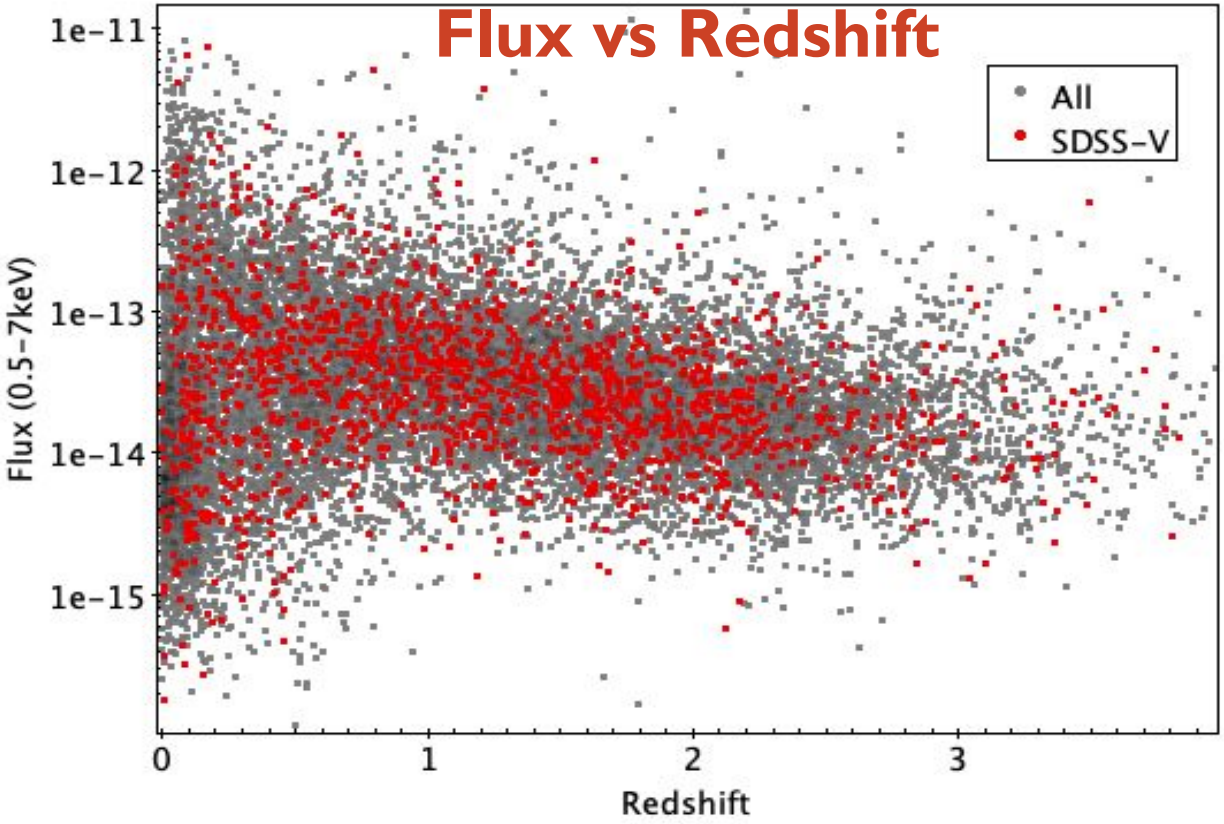
# SDSS-V/CSC Spectroscopy




**All Existing Matches**

CSC2.1p 2022 Oct
Matched (3”) to
DR17 +
spAll-v6_1_0_
through 60229

**17106 AGN**
**4811 Galaxies**
**1085 Stars**
**51 CVs**

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[23053]

# CSC 2 Crossmatches

**Public Matched Catalog Posted Live**

## Introduction

This page contains links and short descriptions of the tables of crossmatches between versions of the *Chandra* Source Catalog 2 and catalogs of sources from several multi-wavelength surveys. All crossmatches have been performed with a Bayesian method developed by Budavari & Szalay (2008) as implemented and extended by either A. Rots (2020) in the *Xmatch* code that takes into account local source density as well as both error ellipses and raw-size ellipses of the sources, or in the *NWAY* code (Salvato et al 2018).

*CSC 2.0* sources are extracted from the *CSC 2.0* Master Sources table. For each crossmatched source pair the match probability (between 0.0 and 1.0), match type (E when positional error ellipse is used, R if source raw size is used) and match grade (D for definite matches, L for likely matches) are provided. The details on these columns can be found here. In addition, ambiguous matches are provided in separate tables.

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## SDSS

### PRELIMINARY CSC 2.1 Production Current Database Crossmatches and SDSS Spectra

Using the NWAY algorithm, we have crossmatched the set of X-ray sources extracted from the CSC 2.1 production current database on 14 November 2022 (389k sources) to four catalogs—*Gaia* DR3, Legacy Survey DR10, PanSTARRS-1, and 2MASS, finding counterparts for 229k CSC 2.1 production current database sources. Cross-matching this table with SDSS DR17 spectroscopy yields more than 17k objects with SDSS spectra, including pipeline classifications and radial velocities. The resulting catalog lists a subset of X-ray information for these sources, includes catalog IDs, positions and magnitudes for all optical/IR matches. We present a README file describing the catalog, and the cross-match catalog itself in FITS and CSV format.

> **Note**
>
> Because this cross-match is performed using the preliminary CSC 2.1 production current database while processing continues, the user should be aware that a few percent of the matches may be wrong, have incorrect positions and/or position errors, or may be rejected entirely by catalog quality assurance when the final CSC 2.1 catalog is released.

A crossmatched table of 188k sources has been submitted to the SDSS-V project as potential targets for spectroscopy. Those that are observed will be matched to upcoming CSC 2.1 sources after the SDSS-V spectral data become public.

# NASA Hubble Fellowship Program

- Deadline for 2024 Fellows applications was Nov 2
- Now permanent: eligibility extension to 4 years post PhD
- Selection Review (virtual)  Jan 16-23, 2024
- Stats: oversubscription up from 15 to 19

| Year | Applicants | | 24Fellows | Panelists | |
|---|---|---|---|---|---|
| | N | %F | %F | N | %F |
| 2023 | 457 | 36% | 54% | 54 | 54% |
| 2022 | 446 | 33% | 29% | 56 | 45% |
| 2021 | 406 | 36% | 58% | 50 | 52% |
| 2020 | 380 | 33% | 54% | 50 | 44% |
| 2019 | 383 | 31% | 42% | 50 | 44% |
| 2018 | 350 | 29% | 38% | 50 | 42% |

# NASA Hubble Fellowship Program

- Leads are implementing or drafting responses to 32 recommendations from NASA review
- Leads have implemented
  - Orientation for new fellows
  - Remote work program (cf telecommuting)
- Hoping to enable NASA centers to host NHFPs
- Fellows have implemented their own Astronomy Mentoring Program for Upcoming Postdocs (AMP-UP)


- Sep 18-22 in Cambridge, MA
- 3 non-science sessions
  - Mentoring/DEIA
  - Grants & Benefits
  - Careers
  - Open Mic


NASA
NExScI
CXC
STScI
NHFP
NASA Hubble
Fellowship Program
Symposium
September 18–22, 2023

# NHFP Open Mic