The NHFP Einstein Postdoctoral Fellowship Program

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In 2018, the NASA Hubble Fellowship Program (NHFP) was inaugurated as the merger of NASA's Einstein, Hubble and Sagan prize postdoctoral fellowships. Up through the fellowship class of 2017, these latter were administered separately by the CXC, STScI and NExScI, but starting with the class of 2018 they are now considered three 'flavors' of NHFP, all administered through STScI. The application and selection process, symposia and overall science policies are guided cooperatively by three leads - Andy Fruchter at STScI for the Hubble, Dawn Gelino at NExScI for the Sagan, and myself at CXC for the Einstein.

The NHFP covers all of NASA astrophysics with science themes that broadly reflect these questions:

- How does the Universe work? → NHFP Einstein Fellows
- How did we get here? → NHFP Hubble Fellows
- Are we alone? → NHFP Sagan Fellows

The 2019 NHFP Announcement of Opportunity was released September 4th 2018, yielding 383 complete applications by the deadline on November 1st, 2018.

We recruited 50 panelists, who reviewed and ranked NHFP applications in mid-January 2019. The huge range of scientific topics demanded seven science panels. Even within those, it was a challenge to span all the expertise appropriate to the task. In the first review phase, applications were initially read and graded by three experts within the assigned panel, but also by two reviewers from a different panel, to ensure that each proposed research program has broad support and appeal. The most highly-ranked 220 applications were then promoted to be read by all the reviewers within the appropriate topical panel for further discussion at the in-person selection review near the Miami airport. Just a handful from each topical panel, with the precise number determined by the original proposal pressure, were then promoted for consideration by the Merging Panel, which consists of the topical panel Chairs and a distinct senior Merging Panel Chair. The Merging Panel then reviewed and discussed all those highest-ranked applicants to arrive at a ranked list, from which to start making offers.

The week following the review, we sent our regrets as quickly as possible to all but the top-ranked few dozen applicants. We then made 24 initial offers. If offers are declined, we move down the waitlist until all 24 positions are filled. A press release about the NHFP featuring a list of the 2019 Fellows has been posted to *http://hubblesite.org/news_release/news/2019-24* with photos and bios of all of them available at *http://www.stsci.edu/stsci-research/fellowships/nasa-hubble-fellowship-program/meet-the-fellows*

This October 21–24 in Washington, D.C., we will host the first NHFP Symposium to include all NHFP fellows together. In the meantime, current fellows continue to produce important and exciting scientific advances, with just a few highlighted here:

- Daniel Siegel ('16) and Jennifer Barnes ('17) (Siegel, Barnes, & Metzger, 2019, Nature, 569, 241) show that a rare subclass of core-collapse supernovae —those associated with the collapse of a rapidly rotating massive star ("collapsars") and triggering long gamma-ray bursts - can synthesize rapid neutron capture (r-process) elements. Indeed, taken together with recent results from the binary neutron star merger detected by advanced LIGO and Virgo, their simulations suggest that such collapsar events dominate the total production of r-process elements in the Galaxy.
- Using *Chandra*, XMM-Newton and Swift, Dheeraj Pasham ('16) discovered a highly-stable, quasi-periodic oscillation in the X-ray emission following the tidal disruption of a star by a supermassive black hole. By assuming an association with epicyclic frequencies predicted from General Relativity, they measured the black hole's spin parameter to be at least 0.7, implying that the event horizon of the supermassive black hole is moving at more than 40% the speed of light. (Pasham et al. 2019, Science 363, 531)
- Ke Fang ('18) worked with the High-Altitude Water Cherenkov Gamma-Ray Observatory Collaboration (HAWC) to discover very-high-energy gamma rays from the jets of the microquasar SS433, the first time that very-high-energy particle acceleration has been observed directly from astrophysical jets (Abeysekara, A. U. et al. 2018, Nature, 562, 82).
- Benedikt Diemer ('18) maintains a community python package called Colossus (Diemer 2018, ApJ, 239, 35) that provides an easy interface for cosmological and structure formation calculations, aimed especially at students and people who may not be experts in these fields.

The NHFP is headquartered on the web at *https://nhfp.stsci.edu*, and questions can be addressed to *nhfp@stsci.edu.*