FINESST Working Group Findings

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APAC Meeting, July 24th, 2024
Executive Summary

- FINESST is a critical component of APD funding for early career astronomers and it is so recognized by the growing community interest
- The current FINESST model (e.g. SMD-wide, funding, review, success rate) does not fully align with the Decadal 2020 recommendations nor with APD R&A standards
- We identify possible improving strategies that will allow us to:
  a) Provide a more customized offer for differing students/faculty needs
  b) Enable all type of institutions to be competitive by lowering barriers to access
  c) Provide a more fair and higher quality review at par with other R&A programs
- We designed the Student Astrophysics Research Grant (STAR) to be an APD standalone student support program
- We seek APAC and community feedback to be able to enact this by ROSES25
FINESST Research Grant

- FINESST is a cross-divisional program element (F.5) that supports graduate student designed research projects relevant to SMD goals.

- The awards provide up to $50k/year for a maximum of three years

- Students/PIs read only one solicitation on NSPIRES to apply all divisions

- Graduate students can use these research funds for their financial support (salary), research project, and career development (e.g. conferences)

- FINESST can support international students (not possible with, e.g., NSF GRFP)

- In APD, FINESST has supported in its current format (2019-2021) more than 71 students across 45 institutions

**Disclaimer:** Graduate students/PIs in non astrophysics fields may have different needs. Other divisions might not see the need to change the current model.
The APD FINESST Working Group has identified the following areas needing improvement:

- Low success rate (~11% in 2022 despite funding allocation of $2.5M, 7.6% in 2023)
- Concentration of awards: 6% of submitting institutions received 30% of awards
- Low rates of submission by certain types of institution (e.g. R2, R3, MSIs)
- Complexity in the ROSES F.5 language:
  - Eligibility criteria for graduates from 4-year institutions may result in a critical barrier to access
  - Full solicitation is 42 pages long (as it includes 5 divisions)
  - Requires full budget
- Student research proposals are evaluated together (1st to 6th+ years) raising fairness concerns
- Current APD review process (mail-in) is non-optimal and changing to a full panel discussion would increase SMD/APD financial burden while also overloading APD program scientists (e.g. APD received 313 proposals in 2023)
The program is incredibly successful in terms of submission numbers (313 in 2023, +20%). A deeper dive into the different aspects of the program (from solicitation language, to type of submitting institutions, and proposal evaluation) has led APD to reassess our participation in the SMD model.

- Despite an increase in funding allocation, the success rate remains below SMD ideal target
- Astro2020 Decadal and APAC recommend higher investments in early career scientist’s development
- FINESST is APD’s largest program by submissions
FINESST-23 Institutional Diversity Analysis

We consider the Carnegie classification and focus on “R2” (Doctoral Universities - High Research Activity)

- 51% of all R1 institutions in US proposed
- 6% of all R2 institutions in US proposed

While most R1s offer PhD in astronomy, not all R2s do. We extended our research to all institutions that offer terminal graduate degree in Astronomy.

*https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/basic-classification/*
Institutions that offer Astronomy-related postgraduate degrees (aka FINESST eligible)

We consider the “R2/R3/M1/M2” that offer terminal degrees in astronomy (M.S./Ph.D.): we found 50 of them.

- There is still a factor of 4 difference between the number of “R2s” and R1s proposing.
- The gap would be greater if all R1s had ongoing Astronomy research (orange section on the left).
FINESST-23 Institutional Diversity Analysis

- We also look at the application pool of institutions that are classified as **Minority Serving Institutions** (HBCU, HSI, TCU) and Black Serving Institutions (BSI).
- For this analysis we included ALL research classifications (R1/R2/R3)
- We also focused on institutions that **have** astronomy **programs** *(not departments)*.

Of 57 MSI/BSI with **astronomy programs**, only 8 (14%) proposed, mostly R1 (5)

**In Summary**

We are **not reaching** a significant fraction of the astronomical community and/or there are **significant barriers** to applicants.

Not surprising, considering the Astro2020 Decadal (State of the Profession) as well as the response to the SMD RIA-23 Solicitation.

Ideas to improve the current FINESST model

We identified actionable ideas to mitigate some of the Division’s concerns and considered their possible outcomes:

- Limiting the number of applications submitted per “Linked organization” to APD in any cycle
  - We could introduce an exception for R1 PIs who decide to mentor FIs at other nearby universities (non-R1)
- Limiting the number of active FINESST grants per institution (e.g. max of 2-3)
- Remove the detailed budget request at submission (lowering barriers for less resourced institutions)
- Increase yearly maximum award amount (from $50k to $70k)
- Redefine the scientific areas of interest in the solicitation to be eligible to submit (like PSD)

Implementing some of these strategies may result in increasing the success rate (up to 25%) and provide a higher quality review process (e.g. better feedbacks to the proposers).

It will not help APD in capturing the breadth of the astronomical community as we embrace the core value of inclusion and foster diversity of thought. It will also be costly in some cases.
STudent Astrophysics Research Grant (STAR Grant)
A Possible APD-focused New Program: STudent Astrophysics Research Grant (STAR Grant)

We recognize the different needs of the different Divisions as well as the communities they serve. For these reasons we envision an APD-specific program, that will not impact other Division’s initiatives.

Objectives:

- **Support the research** (or potential) of early career students (Master or PhD bound students)
  - Research that can advance Astrophysics and fulfill NASA objectives
  - Projects at a well defined stage, e.g. latter years of PhD projects (experienced applicants)
  - Projects at an early stage, that have potential for great discoveries (early grad students, M.S.)

- **Support/increase diversity of thoughts** (NASA strategic goals)
  - We want to serve the broader spectrum of astronomical community and its research endeavors because transformative ideas are everywhere

- **Support the next generation of space-based astrophysics leaders and role-models** (Astro2020 - State of the Profession).
STUDENT ASTROPHYSICS RESEARCH GRANT (STAR GRANT)

We would like to avoid graduate students in early M.S./Ph.D. stage competing against more research-ready late career peers (e.g. 4th, 5th year).

Eligibility:

- **Early Graduate Studies** (funds limited to 2 years): Students enrolled in Master’s/PhD programs for less than “2” years. Possible Advantages for students:
  - May explore a different project/mentor relationship
  - Attend conferences to build their professional network
  - Learn new skills while, e.g., in residence at collaborators

Also, faculty at R2/MSIs may benefit from this as it allows them to attract/retain students in the field/department.

- **Thesis Research** (up to 3 years): Students enrolled in Master’s/PhD programs for longer than “2” years

Possible Advantages for students:

- Take advantage of networking opportunities (with an eye on the job market)
- Pursue in depth research opportunities with collaborators (increase competitiveness of students at less resourced institutions)
- Complete a terminal degree with less financial stress (e.g. need for teaching assistantship)

It will increase faculty funds availability and may decrease funding pressure (especially at non-R1s).
STudent Astrophysics Research Grant (STAR Grant)

Funding model

No changes from FINESST:

● Duration of award up to 3 years*
● Possibility to pay the students through different mechanisms (similar to current model)**

Changes from FINESST:

● Award amount up to $70-$75k/year
● Establishing a “Early Graduate Studies” funding level up to 2 years*.
● Solicitation language should identify just two main budget lines:
  ○ Student research funds (salary, travel) and
  ○ University student costs (IDC, fixed fees)
● No detailed budget will be requested at submission (just budget caps). Full budget only from the awarded PIs (e.g. ADAP-24)

* 2 years for the early graduate students and 3 for the thesis research
** Adopting new 2CFR200 (Oct. 1st 2024) per OMB recommendation
STudent Astrophysics Research Grant (STAR Grant)

Other possible components (some already exist):

- DAPR (FINESST-24 will also be DAPR)
- Inclusion of OSDMP (already in FINESST-23)
- Cohort building and annual symposium
- Be more restrictive about usage of NASA only data vs. non-NASA data (e.g. ground based data)
- Spell out in the call the different areas of interest (e.g. technology/theory and 3 APD “big questions”)

We would like to implement a more fair and higher quality review process that also provides students meaningful and constructive feedback. Some ideas are:

- Cap on number of proposals submitted by a single “Linked Organization” (e.g. NASA EPSCoR)
- Cap on number of active awards per proposing institution (NSF has this too, as NASA /NHFP hosts)
- Evaluation through panel review instead of mail-in

It is critical we do not increase SMD and APD financial and human capital burden (overloading PSs)
Summary of the Proposed Critical Changes

1. **Having a two tiers system with different audiences and purposes**: more fair competition, responding to differing needs of the candidates/institutions, as well as better alignment to NASA APD scientific objectives.

2. **Limit the number of active awards or submissions by same “Linked Organization”**: create a higher quality and manageable review process.

3. **Full panel review**: provide deeper scientific review discussion, high quality and more constructive feedback to the proposing students.

We ask the APAC and the community for feedback on these ideas and possible implementation of the STAR Grant as stand alone APD solicitation.
Questions?
It turns out the same institutions that receive FINESST funds are also very successful in other R&A programs. Limiting the number of active FINESST per institution may have a minimal impact on these PIs.
Definitions of R1, R2, R3 institutions

- We follow the SMD Yearbook definition (in red those eligible for FINESST):
  - R1: Doctoral Universities: Very High Research Activity
  - R2: Doctoral Universities: High Research Activity
  - R3: Doctoral/Professional Universities
  - Non R1, R2, R3, including:
    - i. Masters Colleges and Universities
    - ii. Baccalaureate Colleges
    - iii. Special Focus Four-Year
    - iv. Associate’s Colleges
    - v. Special Focus Two-Year
    - vi. Tribal Colleges and Universities
    - vii. Not Classified

It easy to identify from the number of R1 (146) and R2 (133) institutions which ones have an active Astrophysics research program, our analysis shows that there is a fraction of R3 and "non R1-R3" that are actively pursuing research but do not apply to FINESST (while they may apply to other R&A programs, e.g. ADAP)
Submission/Awards - Institutional Diversity

FINESST-21: total 222
- R1: 204 proposals, 61 institutions
- R2: 18 proposals, 7 institutions
- HSI: 7 R1, 1 R2

FINESST-22: total 264
- Gov: 1 prop, 1 institution
- Res. centers (non NASA): 1 prop, 1 institution
- R1: 243 proposals, 66 institutions
- R2: 17 proposals, 7 institutions
- HSI: 6 R1, 1 R2

In the Country: R1 total 146, 133 R2

Institutions with Astro-programs (Cert, MS, PhD)
- HBCU: 5
- HSI: 38 (including R1, R2)
- BSI: 14
- R2: 49

Institutions with Astronomy Faculty, including PUI
- HBCU: 17
- HSI: 58
- BSI: 16
- R2: 91

FINESST-21 Awards
- 28 R1, 1 R2 (RIT), 2 HSI/R1

FINESST-22 Awards
- 26 R1, 1 R2 (UMass Lowell), 4 HSI/R1, 1 BSI
Funding - evidence for a new model

- Cost of student support is increasing
- Overhead is increasing
- Universities sometimes creates barriers to the PIs/FIs:
  - International students are placed in out-of-state tuition bracket
  - Students are asked to pay out-of-pocket benefits
  - PIs are asked to pay tuitions or other fees they normally would not pay
  - PIs have difficulty in re-budgeting
  - PIs have been refusing awards because university unwillingness to accept, in case of transferred grant
- The detailed budget is clearly a barrier for institutions not accustomed to NASA
- Limit in funding amount per award: student financial needs are rising (e.g. inflation) as well as institutional costs (e.g. tuition, benefits), which impact/reduce the net funding available for research.
### Past solicitations selection rates by SMD Divisions

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<th>Division</th>
<th>ROSES-19</th>
<th>ROSES-20</th>
<th>ROSES-21</th>
<th>ROSES-22</th>
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<tr>
<td>APD</td>
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<td>10%</td>
<td>12.2%</td>
<td>11%</td>
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<tr>
<td>PSD</td>
<td>13.8%</td>
<td>13.2%</td>
<td>14.3%</td>
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<td>44.4%</td>
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<td>16.5%</td>
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