



Accelerator Science and Engineering Traineeship (ASET) Program at MSU

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U.S. DEPARTMENT OF
ENERGY

Office of
Science

ASET Background at MSU/FRIB

- ASET covers all 4 areas of traineeship
- Collaboration between P & A, ECE and ME
- ASET inception date: September 2017
- Four graduate students completed with PhD and AS&E certificate
- Currently 21 PhD students enrolled in ASET Program
 - 14 P&A
 - 4 ME (cryogenics)
 - 3 ECE
- Seven PhD students are stationed in National Labs for Thesis Research
- We plan to admit 5 students in 2022
- ASET website <https://frib.msu.edu/science/ase/graduate-studies.html>

MSU Cryogenic Initiative

- MSU Cryogenic Initiative is a partnership between FRIB and the College of Engineering
- All four ME PhD students working for the thesis on cryogenic topics are enrolled in ASET
- Two undergraduate and two graduate courses on cryogenic topics were established in ME and are being taught by FRIB staff
 - Undergraduate courses attract ~30 ME students

Website <https://frib.msu.edu/science/ase/cryogenic/index.html>

Graduation with AS&E Certificates



Master Degree Program in AS&E, P&A Department

- The proposal “MS in Accelerator Science and Engineering” in the Physics and Astronomy Department was approved by MSU
- Builds on the unique opportunities and strong expertise available at FRIB for accelerator science and engineering
- M.S. program must be with the research that leads to a M.S. thesis
- The basic requirement (in terms of number of credits) are the same as for the regular M.S. in Physics but with certain course requirements
- Students who successfully complete the M.S. degree in Accelerator Science and Engineering must submit a separate application if they subsequently wish to pursue a Ph.D. degree in the Department of Physics and Astronomy.
- The MS in AS&E curriculum is the same as for AS&E Certificate
- The MSU P&A website will be available for the MS applications before the summer 2022

ASET Students Activities

- Usually about 6-7 students attend each USPAS
- The Graduate Student Accelerator Symposium takes place every two weeks
- Accelerator Science and Engineering Seminars at MSU/FRIB, every two weeks
- Internships in National Laboratories or at FRIB
- Another eight ASET students will receive AS&E Certificate by the end of this semester

Recruitment Challenges

- Only US citizens and permanent residents are eligible
- At national level, there are now four AS&E training programs in other universities
 - This Academic Year, several prospective students interested in AS&E most likely went to other Universities
- At MSU ASET is competing with all other branches of Physics: Nuclear Physics, Astrophysics, HEP, Solid state, Quantum Computing...
 - Students entering graduate program are free to select research topics in any field available in P&A Department
 - ASET Faculty works with prospective students
 - » Selection process
 - » Individual meetings with many students
- Not enough ASET Faculty members with highly visible, funded, and competitive research topics to attract students in highly competitive environment
 - Most faculty is very busy with the completion of FRIB project
 - A new Faculty positions in AS&E are planned

Recruitment of undergrads

- We work with MSU students for summer projects
- NSF funded students
- Typically we have eight summer projects supported by the Lab and mentored by ASET Faculty and leading scientists and engineers from FRIB
- We collaborate with FNAL on initiative for underrepresented minority undergraduate students, ASPIRE

Internship Challenges

- Significant challenge to set up summer internships in National Laboratories
- Most challenges are related to the financial support
 - Travel expenses we can pay with the ASET funding
 - ASET can not support housing, should be supported by National Lab
 - Summer salary (including tuition) can be paid by ASET
 - MSU cannot adjust for the difference in living expenses for summer internship

Relocation Challenges

- For thesis research the majority of ASET students should move to National Lab
- At MSU, we need to set up procurement (service) contract which involves large amount of paperwork and takes 3-5 months
 - There is no mechanism to easily set up student research at National Laboratories
- There are no funding to compensate for the rent cancellation by students
- For those who moves to different area, MSU can adjust salary to account for the living expenses

Future of ASET at MSU

- FY22 is the last year of ASET
- The 2017 FOA states “*Award term is expected to be up to five years, with the possibility of renewal for a second term.*”
- There are new DOE FOAs for AS&E workforce training every odd years
 - Most likely, the next call is in 2023
 - We need to renew the MSU ASET program before FY23 through the Office of Science Open Call

Summary

- Despite of many challenges the ASET program well established at MSU/FRIB and produces trained workforce for National needs
- Four recent graduates took jobs at
 - National Labs – 2
 - Industry (microwave) – 1
 - A foreign accelerator Lab for postdoctoral research -1
- Master of Science Program in AS&E is established in Physics and astronomy department
 - We can admit several MS students in 2022
- We plan to admit five new PhD students in 2022 (3- P&A, 1-ME, 1-ECE)