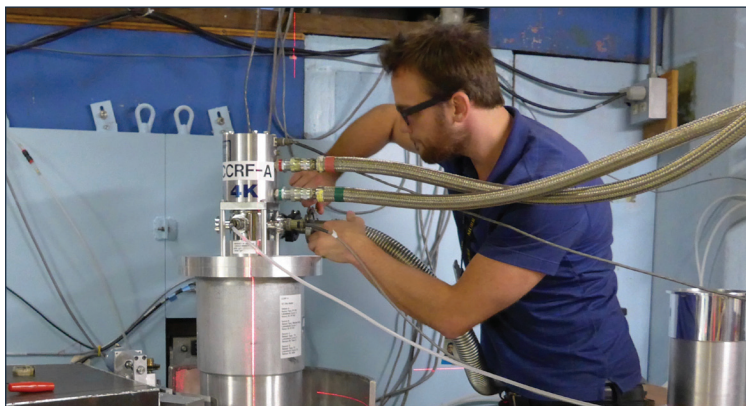




Neutron Scattering IGERT

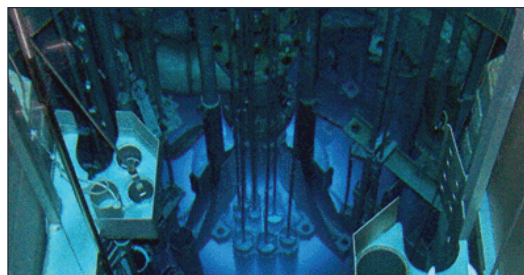
External evaluation finds innovative, effective training.



Interdisciplinary Training

- Training neutron scientists is a national priority to meet demand.
- The MU Neutron Scattering IGERT successfully trained 27 neutron scattering scientists across 6 disciplines over 6 years.
- Results of an external evaluation are positive.¹
- Evidence shows the training model is highly effective, had positive impact on MU, and is positioned to scale and grow.
- Funded by the National Science Foundation IGERT program.

Three Top Takeaways



MU Research Reactor is the most powerful reactor at a U.S. university.

1 The Reactor

MU Research Reactor gives trainees frequent “beam time”² to learn and practice neutron scattering techniques used across scientific disciplines.

Training cannot be duplicated at other universities.



Student-led biweekly meetings present interdisciplinary research in non-technical language.

2 Trainees Benefit

Trainees gain the knowledge, skills, and experience to conduct collaborative interdisciplinary research.

Professional skills training improves communication and helps trainees transition into careers.



NSF IGERT funding enhanced graduate training and stimulated interdisciplinary research at MU. MU offers one of the few neutron scattering programs in the U.S.

3 Positive Impact on MU

New courses and national lab collaborations will persist after funding ends.

- **One million dollars** in student funding
- **Three** new interdisciplinary courses
- **Hands-on** problem-based learning and **writing-intensive** curriculum



“Any university can buy a state of the art electron microscope, but it cannot buy a reactor.”

- Dr. Haskell Taub
Principal Investigator

The Tech

Scientists use neutron scattering to look inside of materials, like doctors use x-rays to look inside of people. Trainees learn to use neutron scattering in biology, chemistry, engineering, and physics.

¹ Edu, Inc., an external evaluation firm, conducted a 6-year evaluation. Edu monitors large federally-funded research and training projects at universities.

² “Beam time” refers to the use of neutron scattering instruments to conduct research.



“Sophisticated users apply neutron scattering to research in biology, chemistry, engineering, and physics.”

Training Outcomes

15 PhDs

5 Masters degrees awarded

27

Trainees from **6** disciplines¹
at **5** institutions

30%

Of trainees are from an underrepresented group (minority or female)

5

Post-doctoral appointments at national laboratories

- **1** NSF AAAS Science and Technology Policy Fellow
- **100%** of PhD alumni are employed

24x7 Beam Time

- **12** MU trainees conducted neutron scattering research at the MU Research Reactor
- University of Missouri offers a **suite of neutron scattering instruments** and a concentration of faculty expertise
- Training **cannot be duplicated** at other universities

15

Student-led biweekly meetings per year

- **25** Students and faculty attend interdisciplinary research presentations
- Video conferences connect researchers at **5** institutions

National Labs – Strategic Collaboration

26 Students train at the national labs

Leading instrument scientists teach trainees to operate advanced neutron scattering instruments and analyze data.

17 Trainees do thesis-related experiments at Oak Ridge National Laboratory (ORNL)

85 Student-days of training
680 Student hours

9 Trainees do thesis experiments at the National Institute for Standards and Technology (NIST)

7 Internships at ORNL

2 trainees took a full-semester online course at NIST
4 lectures at MU by eminent scientists from NIST

2 Students attend 10-day instrumentation training in Sicily

5 Partner Institutions

Indiana University, North Carolina State University, U Missouri – St. Louis, Fisk University

Trainees' Rating

Satisfaction with IGERT



Communication skills



Preparation for career



Satisfaction with courses



Multidisciplinary skills



Evaluation Data Sources

- Annual interviews with trainees (n=20)
- Pre-post survey on STEM career skill gains (n=20)
- In-depth annual interview with PIs
- Review of syllabus and descriptive statistics provided by the project

¹ Biochemistry, Biological Engineering, Chemistry, Mechanical & Aerospace Engineering, Molecular & Structural Biochemistry, Physics.