



# PAN (Physics of Atomic Nuclei)

August 7-11, 2011

## Audience

24 science-focused high school students, both domestic and international. 12 students were female, and 2 were underrepresented in the field. Participants were selected based on interest in science as demonstrated through their applications.

## Funding

Program expenses (~\$15,000) are provided by a National Science Foundation grant to the Joint Institute for Nuclear Astrophysics (JINA), making PAN free to accepted applicants. The National Superconducting Cyclotron Laboratory (NSCL) also supports PAN by donating facilities and faculty/staff volunteers in kind.

## Objectives

JINA's goals for PAN are as follows:

- Teach students about the discipline and current topics of nuclear astrophysics.
- Promote the importance of nuclear research as a worthy investment.
- Introduce students to undergraduate/graduate life and research careers at MSU.
- Increase interest in nuclear physics/astrophysics.

## Description

PAN (now in its 18th year) houses participants on campus. Program hours (45 intentional contact hours) are an intensive mix of faculty lectures, activities, and training sessions introducing students to experimentation methods, equipment, and results. These prepare students to conduct research using the \$1 million Modular Neutron Array. Students complete the program with a poster session to report their findings. Optional activities each evening allow students to learn more about MSU, research, and the college experience. PAN activities were directed and supported by 8 MSU faculty, 10 MSU graduate students, and 3 MSU staff members.

## Outcomes

Students' content knowledge was measured with a pre/post test. Questions involved the motivations behind rare isotope research, the importance of accelerator and superconducting technologies, and detector design. Students averaged 36% correct answers before PAN, and 71% correct after PAN.

- 95% agreed that the PAN program made them excited to go to college.
- 100% agreed that MSU faculty, staff, and students involved with the PAN program helped them understand how to prepare for college.
- 95% agreed that PAN changed their understanding of what a research career requires.



- 80% agreed that they were interested in attending MSU after the program, as opposed to 57% before.
- 86% agreed that PAN developed their skills in working with a group.
- 100% agreed that PAN increased their interest in science.
- 85% agreed they would recommend PAN to a fellow student.
- 90% agreed that PAN will influence their career plans or future academic paths.

In response to survey questions, students offered these thoughts on their PAN experience:

- "[PAN has given me] a much more aware outlook on college and grad school."
- "PAN helped me discover how much more science there is out there to discover."
- "[Of many similar programs, PAN] had (1) the most hands-on science, (2) the most relevant facilities... and (3) the most emphasis on team-related activities, which is important in a scientific research career."
- "I want to be a nuclear astrophysicist."
- "[PAN] encouraged me to continue in STEM."

## Additional Significant Information

David McCreight, a physics teacher at Lansing Eastern High School, has co-directed the program for many years. As a partner, he brings a teacher's knowledge and perspective to help connect with participants and focus the curriculum on secondary education.

## Contact Information

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