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MSU vies for key federal nuke facility

School says winning \$550M lab is critical to maintaining world-class reputation in physics.

Marisa Schultz / The Detroit News

Michigan State University scientists have delivered cutting-edge physics research that has helped unlock clues to the origins of the solar system and laid the groundwork for medical advances for the past generation.

Now they are at a crossroads: They could receive the biggest facility upgrade their lab has ever seen, solidifying MSU's spot as a world leader in rare-isotope physics for at least another generation -- or their days as a destination for the top minds in nuclear science may be numbered.

Their fate is in the hands of 37 people on the U.S. Department of Energy-formed selection committee, who will visit MSU's National Superconducting Cyclotron Laboratory on Oct. 20 to pepper scientists with questions and ultimately decide whether to recommend that a \$550 million Facility for Rare Isotope Beams be built on Spartan soil. They will decide by the end of the year.

"If we don't get it, we would just drift into oblivion," said Konrad Gelbke, director of the MSU lab, noting the university can't afford an upgrade like this on its own. "That's how science goes if you don't do cutting-edge research."

The stakes couldn't be higher for MSU and the state of Michigan, for that matter. The project would not only grant prestige to MSU, but it also would give the beleaguered state economy \$1 billion in economic activity and 400 new jobs over a decade and \$187 million in new tax revenue over 20 years, according to one economist.

The facility "would be a home run for Michigan," Patrick Anderson, principal and CEO of Anderson Economic Group, concluded in his report on the economic impact of the facility. "We rarely get to even bat in this league."

Faced with formidable competition from a federal laboratory, MSU has launched a full-scale effort to lure the project. The university has created a Web site (scienceandjobsformichigan.com), a promotional video and an advisory board made up of

notable business, educational and political leaders to spread the word on the importance of this project.

Breakthroughs back to 1981

In 1981, MSU became home to the world's first nuclear science superconducting cyclotron, which laid the foundation for its research. Now MSU's lab is "the nation's premier rare-isotope facility," according to an August 2007 task force of the Nuclear Science Advisory Committee.

The facility uses big instruments to study something minute -- the center of an atom. Scientists create isotopes -- different forms of an element -- that are not otherwise found on Earth. The idea is that by studying these rare isotopes, scientists will have a better understanding of profound questions: How were the elements made? What happens inside stars?

The research has proven to be invaluable for practical applications, such as medical diagnostic equipment to treat cancer patients, and could create ways to test nuclear weapons without denotation and identify perpetrators of nuclear attacks by studying trace material.

MSU and the United States face stiff competition from Japan and Europe, which invested millions of dollars in state-of-the-art labs in this area of physics.

"It's very clear that those investments abroad will eclipse our capabilities," Gelbke said. "It doesn't mean necessarily that our people are less smart, but they don't have the tools anymore to compete."

Now the U.S. Department of Energy wants to invest in a nuclear physics facility that will allow the U.S. to keep pace with the global competition.

Competition is stiff

MSU's biggest competitor for the FRIB is the Argonne National Laboratory, a Department of Energy lab in Illinois with 2,800 employees and an annual operating budget of \$530 million. MSU's National Superconducting Cyclotron Laboratory is funded by \$20 million annually from the National Science Foundation and has a staff of 300 employees, including 28 faculty and 100 students.

While the Department of Energy says it's committed to an open and fair competition, MSU and others believe the university faces an uphill battle in convincing the Department of Energy to grant such a landmark project to a lab that's not one of its own.

"We think we have the best science," MSU President Lou Anna Simon said. "Argonne would be hard-pressed to deliver science on Day One that we can deliver on Day One. So you say, 'in a rational world you should win.' But this isn't a rational world because there are lots of competing issues."

Scientists at Argonne believe they are best suited for the project because they have had a decade of experience with the underlying technology for the FRIB project, said Walter Henning, the scientist in charge of the Argonne FRIB proposal.

"Michigan State is a good lab, a good size and doing good work, but they have limited experience in that specific technology," Henning said. In addition, 1,900 graduate students and postdoctoral researchers each year conduct research at the lab, coming from 190 U.S. universities.

If MSU is selected, construction on the state-of-the-art technology would take seven years, with the Facility for Rare Isotope Beams fully functioning by 2017. The operating budget for the lab would grow from about \$20 million annually from the federal government to \$50 million to \$60 million a year, Simon said.

Lab funds could dry up

However, without the project, MSU predicts its lab's demise.

Federal money would dry up within a decade because the lab is outdated. Talented MSU scientists may flock to the FRIB lab, Simon said, and graduate students may become harder to attract.

MSU ranks second in the nation, according to U.S. News and World Report, for its nuclear physics graduate program, behind the Massachusetts Institute of Technology. MSU educates 10 percent of the nation's Ph.D.s in nuclear science. However, physics education is not one of the criteria the Department of Energy will weigh when making the determination.

"I never would have been at Michigan State if it wasn't for the cyclotron lab," said MSU graduate student Jill Pinter, 25.

However, she worries what would happen to MSU without the FRIB project. "We are still doing great science," she said. "We are OK right now. But there's no doubt we have to upgrade."

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