NUCLEAR PHYSICS

Isotope factory accelerates

US nuclear scientists find silver lining in economic downturn — lower construction costs.

BY EUGENIE SAMUEL REICH

Given the tough economic times, good news was the last thing that nuclear scientists expected at an 18–20 August meeting for potential users of the Facility for Rare Isotope Beams (FRIB), a planned national facility for nuclear physicists, which will be run under the auspices of the US Department of Energy (DOE). Instead, they heard that the downturn may have an upside: construction of the US$614.5-million facility, originally slated to begin in 2013, could be brought forward a year. Cash-strapped Michigan State University in East Lansing, where FRIB is based, has decided to pump in money while construction costs remain low.

"I'm delighted," says Ani Aprahamian, a physicist at the University of Notre Dame in Indiana who hopes to use FRIB to study short-lived isotopes that are key to the production of heavy elements in stars. "I have students whose futures depend on these studies, and it would be great to be able to do them sooner."

FRIB, expected to serve around 800 users a year, will accelerate ionized atoms down a 500-metre-long series of tunnels folded around like a paper clip and then shatter them against a graphite target to produce beams of rare isotopes at higher intensity than at any other facility in the world. The fragments could include thousands of isotopes that are predicted but have never been seen on Earth (see 'Probing instability').

US nuclear scientists have dreamt of such a facility since the late 1980s, hoping that studying the lifetimes, masses, excited states and structure of rare isotopes might shed light on fundamental questions in nuclear physics and astrophysics. A report from the National Academy of Sciences endorsed the idea in 2007, and in 2009 the DOE's Office of Science signed a cooperative agreement with Michigan State University to build the accelerator by 2020, with a $520-million commitment from the DOE and another $94.5 million from the university.

The proposal to accelerate construction and be ready to begin doing science as early as 2018 is largely the brainchild of physicist and FRIB's project manager Thomas Glasmacher, who says that while thinking of ways to protect the project he came up with the idea of locking in construction costs at low prices. "It's a really good time to build things," says Glasmacher. "People are out of work and that's driving prices down." Calculating that once the US economy rebounded, construction costs would rise fast, he pitched the case to the university. In February the university president agreed, even though a Michigan state budget proposed the same month would cut $69 million in state support for the university. Glasmacher notes that he didn't ask for any extra money. The university will simply allocate $15 million of the promised budget a year earlier than planned. The next challenge for Glasmacher will be persuading the DOE to agree to the accelerated schedule, which he will propose at a peer-review meeting later this month.

Moving FRIB ahead would help remedy the loss of the Holifield Radioactive Ion Beam Facility at Oak Ridge National Laboratory in Tennessee, which the DOE has announced it will stop funding (see *Nature* **471,** 278; 2011), a move to save $10.3 million per year. "The Holifield community supports FRIB," says Witold Nazarewicz, scientific director of the Holifield facility. Aprahamian adds that speeding up FRIB will also enable US nuclear science to compete sooner with facilities already running or planned overseas. The higher intensity of FRIB's beams should enable experimentalists to get reliable statistics on hundreds of isotopes at once, compared with a handful at other facilities.

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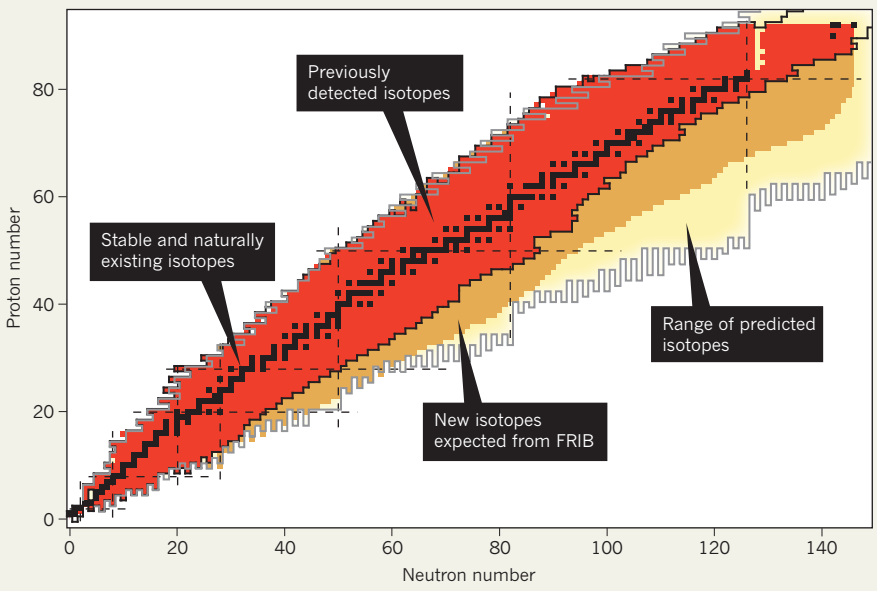
FRIB is not the only science facility to have leveraged low construction costs. "We were fortunate to have negotiated our major contracts at a time when the construction industry was hit hard by the economic downturn," says Steve Dierker, director of the $912-million National Synchrotron Light Source II at Brookhaven National Laboratory in Upton, New York, a future source of high-energy X-rays that is around 60% complete.

However, FRIB's director, Konrad Gelbke, cautions that the whole project still depends on the availability of funding through Congress, and on clearing multiple hurdles at the DOE. A statement from the Office of Science says that a review is scheduled for the spring of 2012 to assess FRIB's readiness to start construction, and that if the review is favourable, the DOE will consider approving construction. "DOE appreciates the continuing willingness of Michigan State University to be flexible in apportioning its part of the cost-share," the statement says.

Glasmacher is confident that his approach is the right one and that the DOE reviewers will see that. "We're presenting it as an opportunity, because the quicker you do a project the cheaper it is," he says. ■

PROBING INSTABILITY

The planned Facility for Rare Isotope Beams (FRIB) will generate isotopes that have predicted but previously undetected ratios of protons to neutrons.



SOURCE: DATA FROM FRIB