



TRIUMF

Canada's national laboratory for particle and nuclear physics
Laboratoire national canadien pour la recherche en physique nucléaire
et en physique des particules

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TRIUMF Sets a World Record for Isotope Production New Isotopes at Record Intensities Will Drive New Discoveries

(Vancouver, BC) --- In the final few weeks of 2011, TRIUMF's main cyclotron and its ISAC facility have set a world record for delivering the most intense beams onto an actinide (a metal heavier than lead and bismuth) target for the production of isotopes. These isotopes have long been sought after by physicists for their role in exploding stars and for their value in stretching and testing modern theories with their exotic properties. This breakthrough makes TRIUMF the most powerful such facility in the world and puts Canada at the forefront of research and development of isotopes for science and medicine.

Reiner Kruecken, head of TRIUMF's Science Division, said, "This capability opens up a whole new world for discovery. We can now produce isotopes that have a disproportionately large number of neutrons, and we can produce them with intensity like nowhere else and use them for precision experiments. This gives us the edge in understanding how exactly nuclei stick together, how stellar explosions formed the chemical elements, and which isotopes will be best suited for the next generation of medical therapies."

Striking a heavy, metal target with an intense proton beam shatters the target's nuclei, producing short-lived isotopes that can be extracted from the target in near real-time. These short-lived isotopes are then separated and purified and sent to experimental areas for study. Some of these isotopes decay within just a few milliseconds, so the entire process must operate like clockwork to be efficient and effective.

The world record was achieved on Saturday, December 3, when the scientific team confirmed that 9.8 microamps of proton beam current (about 60 trillion protons per second) were striking the actinide target material. Before then, the world record was held by CERN's ISOLDE project with a record of about 2 microamps reached several years ago.

Lia Merminga, head of TRIUMF's Accelerator Division that was chiefly responsible for the technical victory said, "The main cyclotron can operate at several hundred microamps of current, but what made this feat extraordinary was the precise level of control and feedback needed to ensure that the specialized target was pumping out isotopes under optimal conditions. This mastery of target and ion-source technology paves the way for ARIEL to completely transform our isotope capabilities."

"When we saw the first francium, rubidium, and other isotopes come rolling in, what was really exciting was knowing that we were seeing something that had never before been accomplished," said Nigel S. Lockyer, director of TRIUMF. "It's not just a new scientific article or a student's Ph.D. thesis---it's a chance to pull back the veil and understand the mysteries of the universe at a deeper level."

On a preliminary basis, several experimental teams confirmed that they had obtained sufficient data to analyze and publish breakthrough results by summer 2012. The record-setting run ends on Wednesday of this week as the TRIUMF laboratory moves into its annual season of maintenance, repairs, and upgrades.

Merminga added, "This result comes from the hard work of a dedicated team of professionals working non-stop for several years. We're very proud of this accomplishment and eager to deploy this capability in the coming years for the benefit of researchers in Canada and everywhere."

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About TRIUMF

TRIUMF is Canada's national laboratory for particle and nuclear physics. Together with its partner AAPS, Inc., TRIUMF also seeks to commercialize its technologies for the benefit of all Canadians. Located on the south campus of the University of British Columbia, TRIUMF is owned and operated as a joint venture by a consortium of the following Canadian universities, via a contribution from the federal government through National Research Council Canada: University of Alberta, University of British Columbia, University of Calgary, Carleton University, University of Guelph, University of Manitoba, McMaster University, Université de Montréal, University of Northern British Columbia, Queen's University, University of Regina, Saint Mary's University, Simon Fraser University, University of Toronto, University of Victoria, University of Winnipeg, and York University. See <http://www.triumf.ca>.