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Canada Foundation for Innovation invests in research infrastructure for major projects

Two University of Lethbridge astrophysicists are among the scientists in a Canada-wide collaboration focused on gravitational-wave (GW) astrophysics that has received infrastructure funding from the Canada Foundation for Innovation (CFI).

The Government of Canada announced \$552 million to provide researchers with the high-impact equipment they need for innovation. The funding supports 92 [research infrastructure projects](#) at 32 post-secondary institutions, including work from ULethbridge's Dr. Saurya Das, a theoretical physicist, and Dr. Alex Tetarenko, an astrophysicist.

ULethbridge is part of GRAIN (**GR**avitational wave **A**strophysics **I**nfrastructure **N**etwork), which also includes the University of British Columbia, McGill University, Université de Montréal, Bishop's University and the University of Manitoba. GRAIN, which was awarded approximately \$5.5 million, will contribute to two international mega-projects that will unveil distant black holes and enable precise tests of theories that push the boundaries of physics.

Gravitational-wave astrophysics is the study of ripples in spacetime generated when massive objects like black holes collide. Studying these ripples gives scientists insights into the structure and dynamics of the fabric of the universe.

Gravitational waves are detected by LIGO (Laser Interferometer Gravitational-Wave Observatory), which consists of two U.S.-based detectors, and LISA (Laser Interferometer Space Antenna), a European Space Agency mission to build an observatory in space. As a space-based detector with three satellites and million-kilometre-long arms, LISA will observe low-frequency gravitational waves from events that ground-based detectors like LIGO can't see, such as mergers of super-massive black holes and signals from the early Universe. GRAIN will ensure Canadian researchers have guaranteed access to LISA data once the mission

launches. This access will enable scientists to test general relativity in new regimes and explore potential new physics beyond Einstein's theory.

"The University of Lethbridge plays a pivotal support role in ensuring Canada's software readiness," says Das, a theoretical physicist in the Department of Physics & Astronomy at ULEthbridge. "My colleague, Dr. Tetarenko, and I will help develop GRAIN's software and participate in data analysis, as well as coordinate with our national partners to obtain the high-performance computing resources we need."

They're also looking at hiring a developer to build and maintain the interface between Canada's Arbutus supercomputing cluster and a new Canadian LISA data centre.

"By combining innovative hardware, sophisticated software and strong international partnerships with the European Space Agency, GRAIN will ensure that Canada remains at the forefront of gravitational-wave astronomy," says Das.

[Read online.](#)

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Our University's Blackfoot name is Iniskim, meaning Sacred Buffalo Stone. The University is located in traditional Blackfoot Confederacy territory. We honour the Blackfoot people and their traditional ways of knowing in caring for this land, as well as all Indigenous Peoples who have helped shape and continue to strengthen our University community.