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LSU Researchers Win \$250,000 Grant to Probe Origins of the Universe

(Source: [LSU Office of Communications & University Relations](#))

BATON ROUGE – Parampreet Singh, assistant professor in the LSU Department of Physics & Astronomy, and Peter Diener, assistant research professor in the LSU Center for Computation & Technology and the LSU Department of Physics & Astronomy, recently received a \$250,000 grant for a potentially breakthrough proposal hoping to answer questions about the earliest state of the universe.

The grant, funded by the John Templeton Foundation sponsored the New Frontiers in Astronomy & Cosmology International Grant Competition, awarded more than \$4 million in research grants to 20 scientists worldwide.

More than 300 proposals were submitted to address questions that have potential to expand the boundaries and deepen the foundation of scientific inquiry.

Singh and Diener chose to focus their proposal on the fundamental question regarding the origin of the universe, which has so far eluded scientists.

It is generally thought that Einstein's theory of general relativity, which is successful in describing the universe when gravitational force is weak, predicts that the universe began with a big bang — an event where all the matter and energy of the universe was concentrated at one point. Unfortunately, Einstein's theory itself breaks down at this point, called a singularity, and cannot predict the earliest state of the universe.

"The goal is to discover a new theory which avoids the problem of big bang singularity, and also captures all the success of Einstein's theory when gravity is weak," said Singh.

One such theory is loop quantum gravity. LSU's theoretical gravity group at the Department of Physics & Astronomy is one of the major centers in the world for research on this subject.

Singh and Diener will harness the power of high performance computers at LSU and other centers in the U.S., to develop sophisticated algorithms to fully understand the new physics near the singularities in cosmos and black holes.

Singh is an expert on quantum cosmology and has made several important contributions to the field, including in the development of big bounce paradigm in loop quantum gravity, which theorizes that our expanding universe did not start from a big bang, but there existed a contracting branch of our universe to which it bounces.

Diener is an expert on relativistic astrophysics and one of the key maintainers of the Einstein Toolkit. He is involved in the development of various supercomputing applications to understand various aspects of gravitational force including the dynamics of black holes.

For more information on New Frontiers in Astronomy & Cosmology International Grant Competition, visit www.newfrontiersinastronomy.org.

For more information on the John Templeton Foundation, visit <http://www.templeton.org>.

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