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Seren Snow and Harrison Tasoff

Gary Horowitz awarded Dirac Medal for contributions to theoretical physics

Joining the sweeping theory of general relativity to the probabilistic world of quantum mechanics is perhaps the greatest challenge in modern physics. Each has been borne out on its own scale by thousands of experiments and observations over more than a century. However, stitching these disparate frameworks together has eluded physicists for just as long, though not for want of trying.

Gary Horowitz is among today's leading figures attempting to bridge this gap. His contributions to this endeavor have earned him the 2025 Dirac Medal, conferred by the International Centre for Theoretical Physics (ICTP), a prestigious honor recognizing his groundbreaking work in gravitational physics and string theory.

Named for Nobel laureate Paul Dirac, the Dirac Medal is awarded annually on Aug. 8, Dirac's birthday, to scientists who have made "significant contributions to theoretical physics." Horowitz shares the 2025 prize with physicists Gary Gibbons, Roy Kerr and Robert Wald.

"We are incredibly proud of Professor Horowitz's many achievements, including his well-deserved recognition with the 2025 Dirac Medal," said Shelly Gable, dean of UCSB's Division of Mathematical, Life and Physical Sciences and the Susan and Bruce Worster Dean of Science. "His work embodies the depth of intellectual

curiosity and ambition that characterize our scientific community at UC Santa Barbara, and we are fortunate to count him among our faculty."

“It is a great honor for me to receive this international award,” said Horowitz, a distinguished professor of physics. “I have been fascinated with black holes for most of my career, and am pleased that I was able to use them to take steps toward a complete quantum theory of gravity.”

An international committee of scientists selects the recipients from among nominated candidates, excluding those who have already received a Nobel Prize, Fields Medal or Wolf Prize — though the Dirac Medal is often viewed as a precursor to such honors.

Horowitz’s research centers on the classical and quantum aspects of gravity under extreme conditions, such as those inside black holes and the big bang — areas where Einstein’s equations break down and a quantum account of gravity is required. His work has helped bridge the gap between general relativity and string theory, expanding scientific understanding of spacetime geometry and quantum phenomena.

A leading figure in the field, Horowitz played a pivotal role in the discovery of Calabi-Yau compactifications, which provide a mathematical framework for connecting higher-dimensional string theory to four-dimensional physical reality.

He has also helped develop models that integrate black hole physics with quantum theory, including work on the black hole information paradox. His collaborations have launched new areas of research: with Andrew Strominger, he explored the gravitational nature of D-branes, contributing to the development of the AdS/CFT correspondence. Later, he worked with Sean Hartnoll and Christopher Herzog to create holographic models of superconductivity, fueling the growth of AdS/CMT as a major research direction.

Indeed, Horowitz is among the leaders in his field, recently named to the Simons Collaboration on Black Holes and Strong Gravity. This new initiative brings together physicists, mathematicians, computer scientists and observational astronomers to ensure that strong gravity discoveries are not lost in the explosion of new gravitational observations.

Horowitz's 2025 Dirac Medal follows his 2023 Einstein Prize from the American Physical Society, which recognized his "fundamental contributions to classical gravity and gravitational aspects of string theory."

"I'm thrilled to see this recognition of Gary's remarkable contributions to the understanding of quantum gravity," said David Stuart, professor and chair of the Department of Physics at UCSB. "This area has long been a strength of the department, attracting outstanding graduate students and postdocs from around the world to study at UCSB with Professor Horowitz and other members of our physics faculty."

Horowitz joined UCSB's faculty in 1983 and has served as a distinguished professor since 2005. "I have benefited enormously from the supportive environment at UCSB, including the Kavli Institute for Theoretical Physics and my physics colleagues," he said.

He was elected to the National Academy of Sciences in 2010 and the American Academy of Arts and Sciences in 2013. He also served as president of the International Society on General Relativity and Gravitation from 2013 to 2016 and chaired the Division of Gravitational Physics at the American Physical Society from 2019 to 2020.

The 2025 ICTP Dirac Medal adds another major accolade to Horowitz's decorated career and affirms his lasting impact on the future of theoretical physics.

Horowitz earned a bachelor's degree in physics from Princeton University in 1976 and a doctorate in physics from the University of Chicago in 1979. He first came to UC Santa Barbara in 1979 as a postdoctoral researcher in the Department of Physics. He later conducted postdoctoral research at the Mathematical Institute, Oxford, and served as a member and Albert Einstein Fellow at the Institute for Advanced Study in Princeton.

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