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Atomic physicist David Weld selected for 2026 National Brown Investigator Award

UC Santa Barbara physics professor David Weld is one of eight distinguished mid-career faculty selected for Caltech's 2026 National Brown Investigator Awards. An atomic physicist who studies quantum dynamical phenomena using ultracold quantum degenerate gases, Weld will receive up to $2 million over five years.

"I am happy and honored to have been named as a Ross Brown Investigator," Weld said. "I especially appreciate the support, from the Brown Foundation and from the campus, for truly curiosity-driven research."

"My hope is that these awards will provide talented mid-career researchers with stable and secure funding at a moment of their career when they are poised to make a significant impact in their field, giving them time to focus and develop their line of thinking," said entrepreneur, philanthropist and Caltech alumnus Ross M. Brown, who established the Brown Institute for Basic Science at Caltech in 2023 through a $400 million gift.

With the support, Weld will be able to conduct experiments using the wavelike character of ultracold atoms to assemble tiny optical systems, including components like beamsplitters, mirrors and lenses. The wrinkle is that because they are sculpted from just a few hundred perfectly-controlled atoms, these optical components will

themselves be fully quantum mechanical objects, capable of existing in superposition states or undergoing entanglement.

While ‘quantum optics’ typically refers to the study of optical systems in which the *light* behaves quantum mechanically, in this new context one can imagine the mirrors and lenses having their own quantum degrees of freedom, he explained. ”What happens when you shine light on something which is in a superposition state such that it is both a mirror and not a mirror? Such ‘doubly-quantum’ optics using fully tunable, entangled femtogram-scale optical elements represents a fascinating new direction for optics,” Weld said, “a venerable field whose history extends far back before Newton.”

Brown established the Investigator Awards in 2020 through the Brown Science Foundation, in support of the belief that scientific discovery is a driving force in the improvement of the human condition. The Brown Institute for Basic Sciences at Caltech seeks to advance fundamental science discoveries with the potential to seed breakthroughs that benefit society. Including this year’s cohort, there are a total of 37 investigators conducting research under the auspices of the Brown Institute for Basic Sciences at Caltech. Brown Investigators from all cohorts are invited to an annual meeting that offers opportunities to share ideas.

Tags
Quantum Science

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All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.