Professor Howard Lee wins award from NSF's Major Research Instrumentation Program

The award will fund an instrument that will enhance nanoscience research at UC Irvine.

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Olti Myrtaj
UC Irvine Physical Sciences Communications



UC Irvine Physical Sciences' Professor Howard Lee (second from left) alongside his award co-principle investigators. From right: Professor Ilya Krivorotov (UC Irvine Physical Sciences), Professor Zuzanna Siwy (UC Irvine Physical Sciences), Professor Lee and Professor Rahim Esfandyarpour (UC Irvine Engineering). Not pictured: Professor Camilo Velez Cuervo (UC Irvine Engineering).

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Professor Howard Lee in the UC Irvine Department of Physics and Astronomy is leading a team of scientists that recently won a $1.409 million award from the National Science Foundation's (NSF) Major Research Instrumentation Program. The award is funding UC Irvine's acquisition of an Electron Beam Lithography (EBL) system – an instrument that will enhance nanoscience research at the university. The system is a critical part of the construction of a nanofabrication facility at UC Irvine that will allow researchers to develop and build nanoscale devices with applications in fields like medicine and photonics.

"Many ongoing projects in the STEM disciplines have an urgent need for this kind of instrument," said Lee. UC Irvine researchers, Lee explained, can use the EBL system in a variety of ways. The instrument can create ultrathin metasurface photonics, which are crucial components for the next generation of imaging and display technologies, and UC Irvine medical scientists can use it to create nanoscale medical components for transformative technologies like mechanical lab-on-a-chip nanoscale devices, sensitive nano-sensors and ultracompact optical endoscopes.

As principal investigator, Lee plans to lay the groundwork for a hub at UC Irvine that enables regional access to the EBL system. The hub will "cultivate a multidisciplinary nanoscience research and teaching program incorporating EBL at a minority serving public institution, UC Irvine," as Lee and his team noted. Lee also plans to use the system to develop outreach and educational programs that expose K-12 and underrepresented minority students to cutting-edge nanoscience research. Lee hopes his team's commitment to student success will give underrepresented minority and low-income students a strong introduction to nanoscience that fosters greater representation in STEM disciplines.

UC Irvine professors Zuzanna Siwy, Ilya Krivorotov, Rahim Esfandyarpour and Camilo Velez Cuervo are co-principal investigators on the award.

Shortly after receiving this NSF award, Lee was also selected as a 2025 Institute of Electrical and Electronics Engineers (IEEE) Photonics Society Distinguished Lecturer. The distinction honors excellent speakers who have made contributions to the field of photonics, and will provide Lee travel funds to give lectures throughout IEEE Photonics Society chapters.

This article was written by Ph.D. student Olti Myrtaj from the UC Irvine Department of Physics & Astronomy. Myrtaj is a UC Irvine School of Physical Sciences Science Communication Fellow.

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