Professor Hamid Hezari wins Frontiers of Science Award in Mathematics

The award honors a paper dealing with a fundamental question in harmonic analysis.
Wednesday, September 20, 2023
Lucas Van Wyk Joel
UCI Physical Sciences Communications



Professor Hamid Hezari of the UC Irvine Department of Mathematics. Hezari, alongside his late Ph.D. advisor and friend, Professor Steve Zelditch of Northwestern University, tackled a long-standing question in mathematics: Can one hear the shape of a drum?

Picture Credit:
UCI

Professor Hamid Hezari of the UC Irvine Department of Mathematics recently won the Frontiers in Science Award in Mathematics from China's International Congress of Basic Sciences – an award that honors scientific contributions of the highest caliber. Hezari's award recognizes a paper he published in 2022 titled "One can hear the shape of ellipses of small eccentricity." The paper, co-authored with the late Professor Steve Zelditch of Northwestern University, appeared in *Annals of*

Mathematics.

“The recognized joint work addresses a longstanding problem in harmonic analysis and mathematical physics known as ‘Can one hear the shape of a drum?’” said Hezari. “This question, initially posed by Mark Kac in 1966, explores whether the frequencies of vibrations of a drumhead can reveal the drum's shape, even if it's not a perfect circle.”

Using a variety of tools, including partial differential equations, dynamical systems and semi-classical analysis, Hezari and Zelditch discovered that nearly-circular elliptical drums create sounds unique among any other geometric shape. However, one needs a mathematically “perfect ear” to distinguish their sounds from other drumheads. Human ears, Hezari explained, are not perfect, and so would not be able to detect the difference.

“Regrettably, my collaborator and close friend, Steve Zelditch, who was also my Ph.D. advisor, passed away in September 2022 and did not witness the recognition of our work,” Hezari said. “Without his invaluable contributions, this achievement would not have been possible, and he is dearly missed by the mathematical community. I also would like to thank my colleagues in the math department for their great support and friendship.”

The award ceremony and the congress took place from July 16-23 in Beijing, China.

News Briefs
Math
Awards
The Future of Fundamental Science
View PDF