Professor Daniel Whiteson receives grant for innovative cosmic ray detection project

Grant will support cosmic ray detector powered by network of smartphones
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Steve Zylius/UC Irvine

UC Irvine Professor Daniel Whiteson and UC Davis Professor Michael Mulhearn have been awarded a grant by the Julian Schwinger Foundation for their innovative CRAYFIS (Cosmic Rays Found In Smartphones) project. The project aims to transform ordinary smartphones into a vast network of detectors that can observe cosmic rays – high-energy particles that originate from space and bombard the Earth's atmosphere.

The idea for CRAYFIS was born after Whiteson and Mulhearn’s work on the Higgs particle discovery at the Large Hadron Collider. Reflecting on how thousands of scientists and engineers contributed to that discovery, they wondered: could a handful of scientists harness the same impact?

Their answer was "yes". CRAYFIS proposes a novel solution: harnessing the power of everyday smartphone cameras as particle detectors. While individual phones are less sensitive than specialized equipment, a large enough network could achieve or even surpass comparable sensitivity to existing observatories at a fraction of the cost and human power.

Ultra-high-energy cosmic rays, which carry millions of times more energy than particles produced at the Large Hadron Collider, remain one of physics' greatest mysteries. These rare particles hit any given square kilometer of Earth just once a century, making detection challenging and expensive. For comparison, the Pierre Auger Observatory in Argentina, spanning 3,000 square kilometers, detects only about 30 of the highest-energy cosmic rays annually.

The Julian Schwinger Foundation grant will fund a crucial first step: a demonstration array of several hundred phones and support for two graduate students. This proof-of-concept stage could pave the way for a global network of detectors, turning smartphone users worldwide into citizen scientists. The CRAYFIS app is designed to work only when phones are charging and idle, ensuring it won't interfere with normal use. Whiteson and Mulhearn’s approach exemplifies how cutting-edge physics can merge with widely available technology to push the boundaries of scientific discovery.

Interested in learning more? Join us on Nov. 6 for The Evans Family Beyond Lecture: Observing the Universe With Your Phone, where Professor Whiteson will give an in-depth look at his CRAYFIS project. Register at

https://ucibeyond.eventbrite.com

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