

Photonics Seminar



Prof. Jaime Cardenas
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On-Chip Weak Value Amplification

Tuesday, October 19, 2021

EEB 132

1:30 PM – 2:30 PM

Zoom Link:

<https://usc.zoom.us/j/91808071892?pwd=VUwyK3NSNW5rSzVLQzFKSGdPc05yUT09>

Abstract: Optical interferometers are the basis for measuring quantities such as distance, velocity, acceleration, temperature, protein binding, and chemical concentration. However, reaching shot noise limited sensitivity is challenging in most cases and usually only possible in tabletop setups in specialized labs. Weak value amplification, an effect discovered by Aharonov and Vaidman in 1988, has been shown to enable shot noise limited sensitivity and has been widely deployed in precision measurements for free space optics. Up to now, however, this technique has been constrained to complex, tabletop optical setups with stringent alignment requirements.

Integrated photonic devices provide a highly robust environment that enables sensing in a variety of environments and would be an ideal platform for using weak value amplification in practical settings. In this talk, we will discuss how to amplify the phase signal in a photonic interferometer without increasing technical noise using weak value amplification. We will compare an amplified interferometer with a standard one and reconfigure the interferometer to sense frequency shifts in the laser.

Biography: Jaime Cardenas is an assistant professor at The Institute of Optics at the University of Rochester. His group works on integrated photonics to transform the way we do things in science and technology. He earned his PhD in Optical Science and Engineering from the University of Alabama in Huntsville in 2005. After two years as a process development engineer, he joined the Lipson Group at Cornell University as a postdoc. He is a member of the Nonlinear Optical Technologies committee for CLEO and the Optical Interconnects committee for IPC.

Hosts: Faculty-Wade Hsu, Mercedeh Khajavikhan, Michelle Povinelli, Constantine Sideris, and Wei Wu
Students-Max Lien and Raymond Yu

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