UNIVERSITY OF CALIFORNIA
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The Department of Mechanical Engineering
Presents

Garrett D. Cole, Ph.D.

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Faculty of Physics, University of Vienna

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Winston Chung Hall 205/206

Crystalline coatings: from cavity optomechanics to ultrastable interferometers

Abstract:
Cavity optomechanics has recently emerged as one of the most dynamic fields in modern optics. The ultimate objective of this interdisciplinary endeavor is to gain access to a completely new parameter regime, in terms of size and complexity, for experimental quantum physics. The fundamental process at the heart of this effort is the enhancement of radiation pressure within a high-finesse optical cavity. Exploiting this weak interaction, i.e. the momentum transfer of photons onto the cavity boundaries, requires the development of mechanical resonators simultaneously exhibiting high reflectivity and low mechanical dissipation. Interestingly, similar requirements—as a means of minimizing the deleterious effects of thermal noise—are found in a broad spectrum of applications, ranging from interferometric gravitational wave detectors to cavity-stabilized lasers for optical atomic clocks. This overlap leads to an intimate link between advances in the disparate areas of optical precision measurement and micro- and nanoscale optomechanical systems. In this presentation I will outline the fascinating perspectives of cavity optomechanics and introduce an entirely unanticipated spin-off technology focused on the development of ultra-stable optical reference cavities.

About the Speaker:
Garrett D. Cole, Co-Founder of Crystalline Mirror Solutions LLC obtained his PhD in Materials Science and Engineering from the University of California, Santa Barbara in 2005. Since completing his doctorate, he has held positions ranging from the first employee of a high-tech startup (Aerius Photonics LLC, now FLIR Electro-Optical Components), to a postdoctoral position at Lawrence Livermore National Laboratory, a Marie Curie Fellow of the Austrian Academy of Sciences, and most recently an assistant professor in the Faculty of Physics at the University of Vienna. Leveraging his expertise in micro- and nanofabrication, tunable vertical-cavity surface-emitting lasers, and cavity optomechanics, Dr. Cole developed the proprietary substrate-transfer process at the heart of Crystalline Mirror Solutions and co-founded the venture in February 2012.

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