

Physikalisches Kolloquium
Einladung

Physics Colloquium
Invitation

Monday, 24 June 2024

BE AWARE - ROOM CHANGE - Lecture Hall **O25/H2**, at 16:15
Coffee and cookies will be served in front of the lecture hall from 16:00

Testing Fundamental Physics with Optomechanics

Dr. Julen Pedernales

Institute of Theoretical Physics, Ulm University



<https://www.uni-ulm.de/en/nawi/institut-fuer-theoretische-physik-start-page/seiten-der-gruppenmitglieder/dr-julen-simon-pedernales/>



Quantum mechanics has been remarkably successful in describing the microscopic world, yet its applicability to larger scales, beyond a few thousand atoms, remains largely unexplored experimentally. This frontier is, however, quickly expanding thanks to the progress in the quantum control of the mechanical degrees of freedom of increasingly larger solids. Optomechanical systems, in particular, are emerging as a promising platform to conduct quantum experiments in an unprecedented mass regime. It is expected that, in their most advanced form, these quantum platforms will be able to address fundamental questions in physics that remain unanswered today: Does the linearity of quantum mechanics persist at mesoscopic/macroscopic scales? Can the source of a gravitational field be placed in a quantum-coherent spatial superposition? In my talk, I will explore the unique opportunities and significant challenges presented by these emerging quantum platforms and discuss in which precise way such advanced experiments could address these fundamental questions.

