ICFO

SEMINAR: Laser-interferometric and optomechanical technologies for astrophysics and Earth science

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15:00

Seminar Room

Abstract:

Coherent light enables length measurements of exquisite sensitivity that lie at the core of fascinating technological advances and engineering applications, as well as observations in fundamental physics, astrophysics, geodesy, and measurement science in general.

Novel technologies and measurement principles find application in areas that are paradigm-changing; not only in fundamental science, but that directly impact the global economic and political stage. Detections from ground- based gravitational-wave observatories, like LIGO and VIRGO together with measurements of their electromagnetic counterparts, have opened a new window to observe the universe's gravitational spectrum and have reshaped astronomy and astrophysics through Gravitational Wave and Multi-Messenger observations. Plans for future observatories in space, such as LISA, have already started through the extremely successful LISA Pathfinder mission. Moreover, GRACE follow-on continues GRACE's legacy of providing information regarding climate change and our planet's geo-dynamics through valuable observations of the Earth's gravitational field.

Compact and integrated optics and photonics combined with low-loss devices and optomechanically coupled coherent light fields enable us to reach unprecedented measurement accuracies near the quantum sensing limit, which may be relevant for novel approaches to observe gravitational waves and detect dark matter.

At the core of these exciting scientific endeavors lie innovative optomechanical technologies and precision laser interferometers that make this all possible. In my presentation, I will comment on these applications and discuss the research work conducted in my research group at Texas A&M University on the advances and implementation of novel optomechanical technologies in areas of precision measurements, inertial sensing, and scientific space missions.

Hosted by: Prof. Dr. Valerio Pruneri