

ICFO Colloquium Series: Nuclear laser spectroscopy - the story of Thorium-229

THORSTEN SCHUMM

April 10, 2026

10:00 to 11:00

ICFO Auditorium

PROFILE

Thorsten Schumm was born 1975 in Berlin. He studied Physics and Philosophy in Berlin, Innsbruck and Heidelberg. His PhD thesis in experimental physics was carried out as a bi-national research project (Cotutelle de Thèse) in Paris and Heidelberg in the groups of Jorg Schmiedmayer and Alain Aspect. It finished 2006 and was awarded the Ruprecht-Karls prize of the University of Heidelberg. After a short research stay in Toronto, Thorsten Schumm became an Assistant Professor at the TU Wien in 2006. Since 2011, he is leading the Quantum Metrology research group as a University Professor. His research was awarded the START prize in 2009 and the ERC starting grant in 2010, in 2015-2020 he has coordinated the EU FET-Open research alliance *nuClock* and an ongoing ERC Synergy project since

2020. Thorsten Schumm's research focusses on the development of novel measurement methods based on principles of quantum mechanics, in particular atomic and nuclear clocks and matter wave interferometry.

ABSTRACT

Among the >3000 isotopes, Thorium-229 provides the lowest-energy nuclear first excited state, a so-called isomer state.

This isomer state at 8.4 eV is the only nuclear state accessible to laser manipulation and spectroscopy.

Its long >10 minutes lifetimes with a connected narrow transition linewidth, combined with the intrinsic robustness of nuclear transitions, makes it an exciting candidate for a nuclear clock.

The talk will report on recent developments in this field, triggered by the first laser excitation of Thorium-229 in 2023.

We will report on a prototype solid-state variant of a nuclear clock, optical Mössbauer spectroscopy, CW laser absorption spectroscopy, and first constraints on ultralight dark matter models.

Hosted by: Prof. Dr. Leticia Tarruell