ANNOUNCEMENT - TALK

Title: **Tracing light: on Linear and Nonlinear Terahertz Polaritonics in Quantum Paraelectrics**

Abstract: The advancement of high-speed data processing and signal manipulation technologies has pushed the frontier into the terahertz (THz) frequency range, raising a fundamental challenge: how to efficiently control electromagnetic fields at these frequencies. This issue, often referred to as the "THz gap" in optical and electronic engineering, remains a major obstacle to practical applications. A promising strategy is to manipulate THz electromagnetic waves through polaritons—hybrid light-matter excitations—that harness the intrinsic nonlinear response of matter.

In this talk, I will introduce Quantum Paraelectric (QP) solids as a novel platform for THz phonon-polaritonics, leveraging the extreme nonlinearity of $SrTiO_3$ in its QP phase, which arises due to its proximity to the incipient ferroelectric state. This strong nonlinearity enables efficient self- and cross-coupling between polaritons, paving the way for all-optical, field-programmable THz polariton circuits.

In the second part of the talk, I will turn to the basic problem of linear propagation of THz electromagnetic waves in $SrTiO_3$ and $KTaO_3$. As it turns out, our experimental data challenges long-held assumptions about light propagation in dispersive dielectrics—an area considered settled since the foundational works of Lorentz, Sommerfeld, and Brillouin — bringing a fresh perspective on a fundamental problem in wave physics.

Date/Time: **FRIDAY, MAY 16 at 13:00**
Location: **MPSD 900.EG.136**

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