

SEMINAR: High Pressure Ultrafast Dynamics of $\text{LaH}_{10}\pm?$ and $\text{La}_3\text{Ni}_2\text{O}_7$ and Emergent Quantum State in 1T-TaS_2

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12:00 to 13:00

Blue Lecture Room

I will present our recent works on high-pressure ultrafast spectroscopy. We innovated an on-site in situ high pressure pump-probe ultrafast spectroscopy instrument [1,2], which enables precise measurements of both the amplitudes and lifetimes, featuring independent tuning and precise control of pressure and temperature at low and varying temperatures. Using this instrument, we found pressure-induced phonon-bottleneck effect [3]. Further, we have achieved time-resolved low temperature ultrafast spectroscopy of $\text{LaH}_{10}\pm?$ under a ultrahigh pressure [4]. This first ultrafast dynamics investigation of superhydrides provide direct experimental evidence that strong EPC is responsible for the near-room-temperature superconductivity in clathrate superhydrides. Significantly, we have experimentally detected the ultrafast dynamics of pressurized nickelate superconductor $\text{La}_3\text{Ni}_2\text{O}_7$, revealing relatively strong EPC and precisely measuring its superconducting gap [5]. Finally, our high-precision ultrafast collective dynamic measurements uncover an emergent quantum state in the CDW material 1T-TaS_2 below 65 K [6].

Hosted by: Prof. Dr. Jens Biegert