סמינר מחלקתי – הנדסת חומרים

הנכם מוזמנים בזאת לסמינר מחלקתי
אשר יתקיים ביום ה', 30 באוקטובר 2025 , ח' בחשון תשפ"ו,
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Exploring New Horizons in Complex Oxide Quantum Heterostructures through Stacking and Twisting

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Complex oxides display a remarkable array of functionalities crucial to advanced electronics, energy, and information technologies, including ferroelectricity, piezoelectricity, and pyroelectricity. The fascinating physical properties of these materials stem from the intricate interplay among lattice, orbital, charge, and spin dynamics. In this talk, I will present an overview of our latest findings on manipulating the properties of oxide heterostructures by deliberately altering the symmetry in oxide heterostructures. Specifically, I will shed light on the recently developed freestanding oxide membranes and devices, which have rapidly become a vital platform for experimentalists to engineer materials with unprecedented properties. These membranes, predominantly composed of transition metal oxides, are fabricated as ultrathin, quasi-2D layers with atomic layer control. They can then be reconfigured into multilayer structures with precisely controlled twist angles between layers. To understand our experiments, we developed a methodology to create machine learning potentials specifically designed for the moiré structures of twisted oxide layers. Additionally, we used phase field simulations to determine the twist-dependent polarization, achieving results that closely match experimental observations. These advancements offer unique opportunities to control and explore the diverse and novel functionalities of complex oxides and their interfaces.