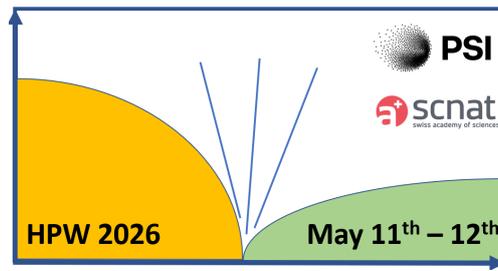


High Pressure Workshop



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Type: **Talk**

THz control of Mott insulators under pressure

Tuesday, 12 May 2026 13:00 (30 minutes)

Mott insulators are archetypal examples of quantum materials. Strong interest in these systems has arisen due in part to the insulator-to-metal transition that some exhibit when the balance between on-site Coulomb repulsion and hopping is overturned via temperature, doping, pressure or, as more recently demonstrated, photoexcitation or the application of short electric field pulses. I will discuss our ongoing work on different Mott insulator compounds, namely vanadates such as V_2O_3 and lacunar spinels such as $GaTa_4Se_8$, where we investigate the effect of above bandgap (optical) and below bandgap (THz) excitation in controlling the electronic and structural order in the system. We are particularly interested in answering questions such as: 1) is a structural change, or more specifically a structural symmetry change, necessary to stabilize a photoinduced metal-insulator transition? or 2) are there metastable hidden phases in the free energy landscape of these systems and is there an optimal nonequilibrium pathway to accessing them?

In order to successfully investigate the out-of-equilibrium response of the material, we aim to diversify the ground states we can access. More specifically, we reduce the available parameter space by choosing one external parameter, such as pressure, which can be continuously controlled (contrary to doping) while preserving thermal equilibrium (contrary to temperature). Pressure has been used extensively to draw phase diagrams in equilibrium but only to some extent with ultrafast measurements. Combining terahertz spectroscopy or terahertz photoexcitation with pressure poses, however, significant technological challenges. I will discuss our progress in this field, and report on our proof-of-concept results on silicon as well as on our preliminary results on Cr-doped V_2O_3 , a canonical Mott insulator.

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