

## Seminar

of the Department of Complex Matter F7

**Thursday, 14.2.2019 at 11:00,**

Seminar room F7

# Direct detection of ultrafast switching in quantum cryo-memory devices

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Giant leaps in information technology place demands for devices that can no longer be met by current semiconductor technologies, while the power consumption of the IT sector is an urgent global environmental concern. Cryo-cooled supercomputers and quantum computation are prospective directions, which both face the same barrier: No high-performance storage memory is available for low-temperature operation.

In this short seminar, I will present my proposed post-doc project using the SwissFEL facility at PSI. The ultimate goal of the project is to develop fundamentally new storage-class memory devices, which overcome major challenges in speed and switching energy. We will follow a concept based on electrical and optical switching between the metallic/insulating charge-ordered topologically protected quantum states of 1T-TaS<sub>2</sub>. While the optical switching is well understood and achieved in record-breaking 0.5 ps, the less explored electrical switching has yet greater potential for an ultrafast memory device, due to its ease of implementation in standard electronics. I want to clarify the processes which drive the electronic transition, and determine the rate of the domain growth and its limits on switching speed. To achieve this, I will conduct a novel kind of position-dependent switching experiment using ultrafast electronic pump pulses and the SwissFEL X-ray free-electron laser as the structural probe.

The lecture will be held in English.

Cordially invited to attend.

