



**Physikalisches Kolloquium**  
**Einladung**

**Physics Colloquium**  
**Invitation**


**Monday, 20 May 2019**

Lecture Hall N24/H13, 16:15

Coffee and cookies will be served in front of the lecture hall from 16:00

**Thermal Scanning Probe Lithography: Expanding  
the fabrication horizon in nano science**

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 SWISSLITHO



Thermal scanning probe lithography (tSPL) emerged as an off-spring from IBM's Millipede data storage project which pioneered the highly parallel operation of cantilever arrays to emboss and read-back digital data in the form of nm size indents in a polymer media. tSPL also uses heated atomic force microscope (AFM) tips to create lithographic patterns by locally evaporating a thermally sensitive resist. This process enables the fabrication of precise 3D patterns and high resolution structures without the use of charged particles, such as electrons, which have been implicated in substrate damage. Moreover, AFM imaging is exploited for in-situ inspection of the substrate surface before patterning and of the lithographic structures written into the substrate. This capability significantly expands the scope of direct write mask-less lithography beyond the common state of the art in several ways. Lithographic patterns can be easily aligned with pre-existing features such as nano-wires and even single layer graphene or MoS<sub>2</sub> flakes. An entirely new feature is the capability to fabricate 3-D structures with 1 nm topographic precision using on the fly feedback control of the patterning process. The immediate visual feedback of the patterning success allows fast turnaround processing which is further enhanced by the absence of proximity effects. tSPL has been pioneered at the IBM – Zurich research laboratory over the past ten years. In 2012 an independent company SwissLitho AG was founded to commercialize the technology. A huge number of applications to solve real world nano-physics problems have emerged since then. The talk aims at introducing the technology and discuss a selection of interesting physics applications.