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**Nanoscale investigations of thin films, heterostructures and interfaces with low energy polarized muons.**  
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Positive polarized muons act as a non-destructive, non-invasive, and microscopic probe of matter (Muon Spin Rotation/Relaxation,  $\mu$ SR). Over the years they have provided unique information about magnetic, superconducting and other electronic properties of bulk matter. An extension of the  $\mu$ SR technique is given by the availability of muons with 100 % spin polarization and whose energy can be continuously varied in the sub-keV keV range. This allows novel depth dependent  $\mu$ SR-studies on nm scale providing unique information in cases where the order parameters or the electronic properties are not homogeneous such as in heterostructures, thin films, buried layers or near the surface of a crystal. After a brief introduction of the low energy  $\mu$ SR technique at PSI, I will overview some experiments including investigations of unconventional high-Tc superconductors, low dimensional magnetic systems and of compounds and heterostructures, which may be relevant for future spintronics applications.