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S E M I N A R
aus
Halbleiterphysik und Nanotechnologie

Mo, 05.10.2020, 11:15 Uhr, (als Webinar)

Um Anmeldung wird bis spätestens Fr, 2.10.2020, 11 Uhr unter physics@unileoben.ac.at gebeten.
Danach werden die Zugangsdaten zum Webinar individuell zugesandt.

"The Invincible Iron-Talc: 2D Magnetic Layers"

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Since the first reports on graphene in 2004, many other 2D materials were isolated, demonstrating unparalleled electrical, mechanical, and optical properties. However, the intrinsic magnetic ordering in 2D materials was missing for more than one decade. In 2017, ferromagnetism in monolayers was first reported in CrI_3 and $Cr_2Ge_2Te_6$, initiating intense experimental and theoretical research on 2D magnetism. Thus far, the price-to-pay for accessing monolayers of intrinsic magnetic materials was the lack of ambient stability and the fact that magnetic ordering persists only at cryogenic temperatures. The full potential of intrinsic 2D magnetic materials cannot be reached without two main requirements: *i)* **The materials must be air-stable, especially monolayers;** *ii)* **The critical temperature for long-range magnetic ordering must be above room temperature**. Meeting these criteria will allow for the integration of 2D magnets into spintronics, data storage, magnetoelectronics, magnetooptics, sensing, biotechnology, medicine, and other fields.

This study investigates the possibility to employ a phyllosilicate mineral – iron-rich talc – as a platform for air-stable monolayers that encapsulate iron atoms with high local magnetic moment. Structural and morphological analysis comprising of atomic force microscopy, electron probe micro analysis, wavelength dispersive X-ray spectroscopy, Raman spectroscopy, and tunneling electron microscopy are combined to prove that iron atoms are dissolved in talc layers, indicating substitution of magnesium as the main incorporation mechanism. Further, first principle calculations, magnetic force microscopy, and superconductive quantum interference device magnetometry are employed to investigate magnetic response of these materials.