JOHANNES KEPLER UNIVERSITÄT LINZ

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HFP | Institut für Halbleiter- und Festkörperphysik

Master Thesis

(in experimental physics, nano science) starting 2017

Mechanical Quantum-Resonators Studied by Radio-Frequency Scanning Tunneling Microscopy

Topic: The work addresses fundamental properties of nanomechanical quantum resonators formed by self-assembled linear arrangements of (a small number of) weakly physisorbed paramagnetic molecules on single-crystalline noble metal surfaces. The work investigates their electronic, magnetic, mechanical and dynamic properties with a focus on verifying - by clever design of experiment - their expected quantum character.

The main experimental tool will be a worldwide unique **radio frequency scanning tunneling microscopy (rf-STM)**, developed recently in my group at the JKU Linz. Besides operating the instrument in the conventional dc mode for image acquisition and conductance spectroscopy with sub-nanometer resolution, two different rf-modes of operation will be applied on the quantum resonators: 1. Forced rf excitation by an external microwave source. 2. "Passive" read-out by a sensitive high-speed analyzer of tunneling current signals modulated in the rf regime by self-oscillating quantum resonators.

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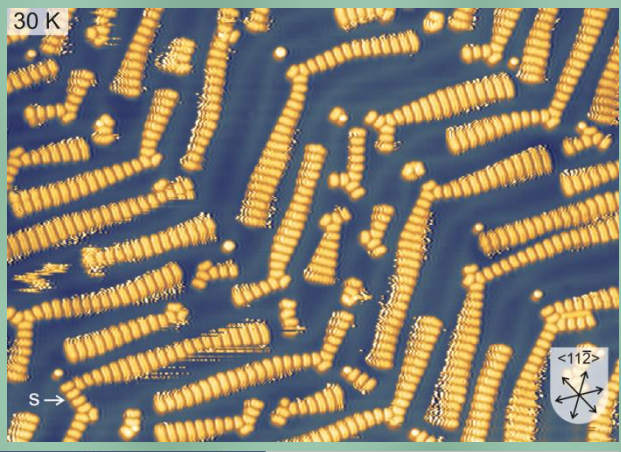

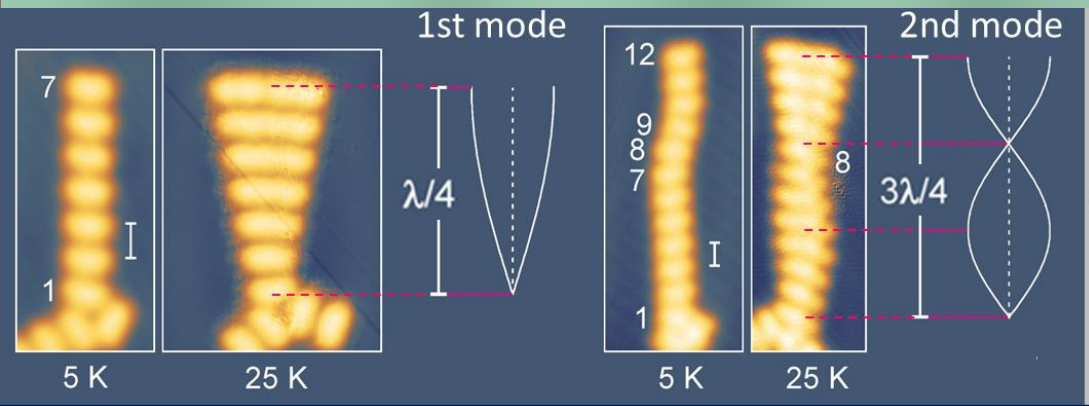

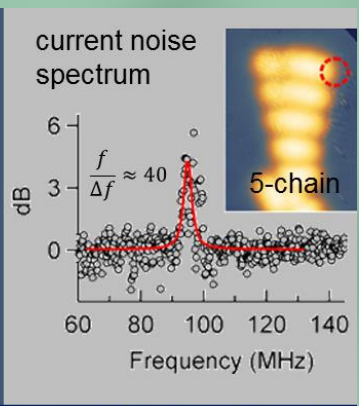

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