PHYSIKALISCHES KOLLOQUIUM

Wintersemester 2022/23

Das Kolloquium findet (soweit nicht anders angegeben) **jeweils montags um 17:15 Uhr in Präsenz im Röntgen-Hörsaal des Physikalischen Instituts, Hubland Campus Süd, Universität Würzburg und online via Zoom statt.**

Link zum Zoom-Raum:
https://go.uniwue.de/physkolloqzoom

21.11.2022

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Exploiting the full potential of focused particle beams for nanofabrication

Abstract

Future breakthroughs in nanotechnology will rely on the ability to fabricate materials and devices by design, i.e., to tailor both material properties and device geometries according to a sophisticated blueprint. Direct writing using focused beams of ions or electrons is a powerful technique not only for rapid-prototyping of novel device components but also for mask-less processing of delicate nanostructures and local modification of materials. To achieve an optimal result in the patterning process, a full control over the beam path including its rasterization is necessary. Here, we present the open-source Python toolbox FIB-o-mat for automated pattern creation and optimization.

He and Ga ion beam processing as well as direct electron beam writing are applied to three different research cases: a) The controlled generation and movement of skyrmions was achieved by locally modifying the magnetic potential landscape of Co-based multilayers using He irradiation. b) Plasmonic tetramer antennas were cut from single-crystalline gold on glass, demonstrating the ultimate patterning resolution of the focused He ion beam with gap

sizes down to 3 nm. Furthermore, a highly efficient plasmonic circular polarization converter consisting of double helical antennas was directly written with the electron beam in a parallel printing approach. c) Finally, focused He and Ga ions moving along an optimized beam path were used to pattern suspended graphene into complex phononic crystal structures.

Für die Dozentinnen bzw. Dozenten der Fakultät

PD. Dr. Meyer, Prof. Dr. Assaad, Dr. Feichtner und Hr. Kögel