Westfälische Wilhelms-Universität Münster

FACHBEREICH PHYSIK

Allgemeines Physikalisches Kolloquium

Donnerstag, 30.10.2014 um 16 Uhr c.t.

Prof. Dr. Josef Zweck
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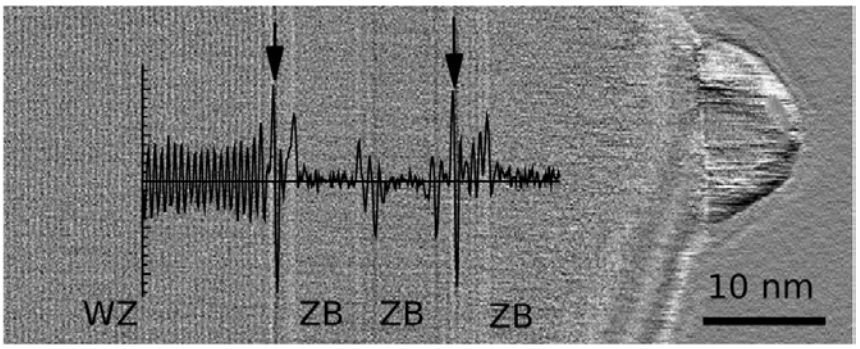
Universität Regensburg

Differential phase contrast in a STEM – imaging of magnetic and electric fields

Standard electron microscopy techniques use either a parallel beam (transmission electron microscopy, TEM) or a scanned focussed probe (scanning transmission electron microscopy, STEM) to form an image of a specimen. The resulting image carries information on the local scattering power and/or the local phase shift experienced by the electron wave and yields resolutions well below 100 pm. These techniques, however, are insensitive to local deflections of the beam due to electric or magnetic fields. For these, the differential phase contrast (DPC) technique comes into play. It utilizes a segmented detector to monitor minute deflections of the beam due to inner and external fields and allows a mapping of micromagnetic and electric fields within a specimen.



Differential phase contrast image of a GaAs nanowire, consisting of Wurtzite and Zinkblende segments. From the line scan one sees immediately the spontaneous polarization within the Wurtzite (WZ) segments, while the Zinkblende (ZB) is obviously non-polar. ("Direct detection of spontaneous polarization in wurtzite GaAs nanowires", Applied Physics Letters vol.104, issue 21, 211902 (2014)).

In this talk, I will give numerous examples of nanometer-sized electric and magnetic field distributions, which can be quantified and manipulated by external fields. Using today's corrected electron microscopes with probe diameters down to 80 pm the mapping of interatomic field distributions within a unit cell seems within immediate reach.

IG1 HS2, Wilhelm-Klemm-Straße 10
Kolloquiums-Kaffee ab 16.00 Uhr vor dem Hörsaal
Im Anschluss an den Vortrag findet ein geselliges Beisammensein mit Getränken und Knabbereien statt.

Kolloquiumsbeauftragter: Prof. Dr. Bratschitsch
Einladender: Prof. Dr. Kohl