WWU MÜNSTER

Aktuelle Fragen der Nanophysik

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Online Seminar

Investigation of strain and topography of 2D-Materials in a TEM

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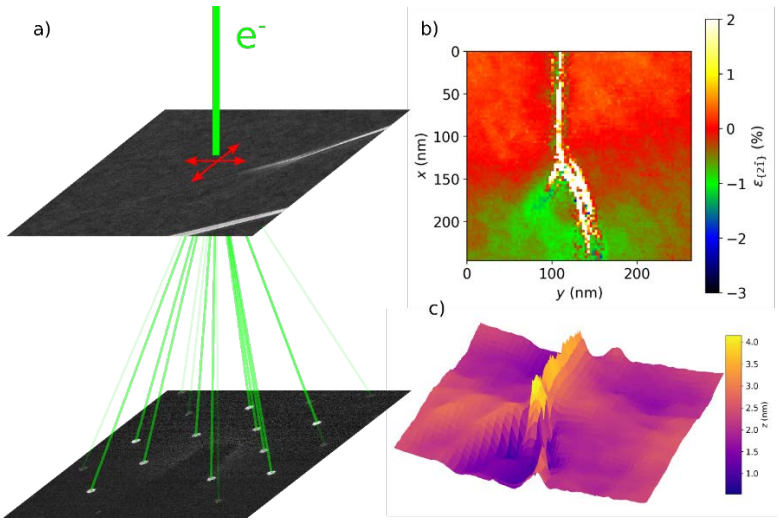
Electrical and optical properties of 2D-materials have been intensively studied with respect to a large variety of possible applications. It has been shown that many of these properties are closely related to the local atomic structure. Therefore it is necessary to quantitatively measure the strain and topography on the nm-scale. Using a TEM has several advantages compared to light optical methods and contact mode measurement techniques like (AFM or STM), namely very high resolutions (<1nm) and measuring a sample without physical touching. The biggest problem with most TEM strain measuring techniques is the distinction between strain and topography at 2D-Materials.

I propose a technique based on NBED (Nano Beam Electron Diffraction) mapping, that allows quantitative and disentangled measurements of strain and topography on the nm-scale with precision below 0.1% for the strain. The theoretical concept will be supported by simulations and proof of concept measurements.



a) Experimental setup of NBED-mapping.
b) Tensile strain in {2-1-10} direction of WSe_2 monolayer freely suspended with fold.
c) 3D reconstruction of the sample.