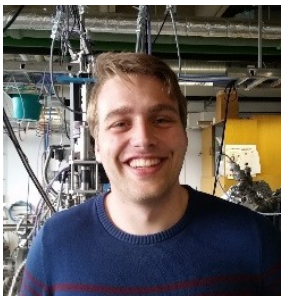
WWU MÜNSTER

Aktuelle Fragen
der Nanophysik

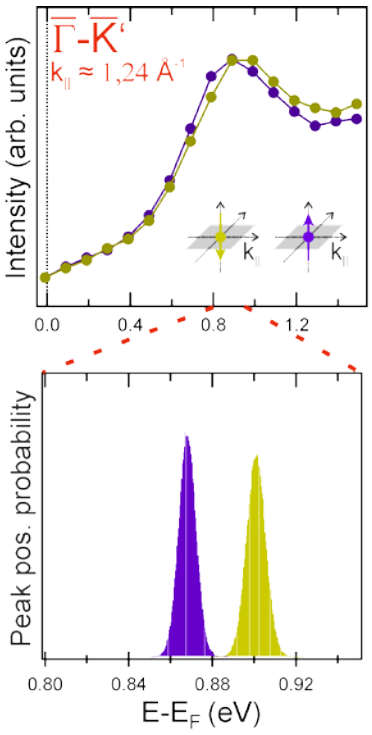
Montag, 23.10.2017 um 15.15 Uhr
Ort: Seminarraum 87, Wilhelm Klemm-Straße 10

Electronic and spin structure of single-layer WS_2 on Au(111)



Philipp Eickholt
AG Donath
Physikalisches Institut

In the field of 2D materials, single-layer transition metal dichalogenides, especially MoS_2, WS_2, $MoSe_2$ and WSe_2, play an important role. Due to their exceptional optical and electronic properties, they are promising materials for optoelectronical applications [1]. The key to understand the material properties is a profound knowledge of the electronic structure. While the occupied electronic structure was investigated in a number of studies, the crucial information about the dispersion and spin structure of the conduction bands is still missing.
Spin- and angle-resolved inverse photoemission (SRIPE) [2] is the ideal technique to study dispersion and spin structure of the unoccupied electronic bands. In this talk, we present a SRIPE study of the conduction bands of single-layer WS_2 grown on Au(111). The focus of the presentation will be on the lowest conduction band near the K valley, which is decisive for the optoelectronic properties of the materials. In addition, a combined spin- and angle-resolved photoemission (SARPES) and SRIPE experiment, performed within the same apparatus, unravels the spin order of the valence and conduction bands in the K and K' valleys.



Top: SRIPE spectra along $\bar{\Gamma}$-$\bar{K}$' with out-of-plane spin sensitivity showing the spin polarization of the conduction bands. Bottom: Statistical peak position distribution as a result of a peak analysis considering the statistical uncertainty as described in [3].

[1] D. Xiao et al., Phys. Rev. Lett. **108**, 196802 (2012)
[2] S.D. Stolwijk et al., Rev. Sci. Instrum. **85**, 013306 (2014)
[3] F. Passek and M. Donath Phys. Rev. Lett. **69**, 1101 (1992)