WWU MÜNSTER

Aktuelle Fragen der Nanophysik

Montag, 05.06.2023 um 15:15 Uhr
R87, Wilhelm-Klemm-Str. 10

Spin and Orbital Rashba Effect at Tellurium – Metal Interfaces


© Dr. Maximilian Ünzelmann

Dr. Maximilian Ünzelmann

Experimental Physics 7
University of Würzburg

The Rashba effect is fundamental for the physics of two-dimensional electron systems with inversion symmetry breaking (ISB) acting in a polar out-of-plane fashion. Via the interplay with spin-orbit coupling (SOC), this leads to a lifting of spin degeneracy in the electronic states located at surfaces or interfaces. Moreover, the effect enforces a locking of the electron's spin perpendicular to its momentum, i.e. it leads to a characteristic chiral spin texture. The actual microscopic origin of the Rashba effect has intensively been debated in recent years. In 2011, a model was theoretically predicted [1,2], suggesting that the so-called orbital Rashba effect, i.e. the ISB-induced formation of a chiral orbital angular momentum (OAM) texture, generically precedes the formation of Rashba-type spin-orbit splittings. While this model had already found useful applications [3-5], clear experimental evidence was long lacking.

In this talk, I will discuss our recent experimental results on the spin and orbital Rashba effect at Tellurium – Metal interfaces. In particular, I will address spectroscopic evidences for the OAM-based origin of the (spin) Rashba effect [6] and the applicability of the model to more complex effects of lattice symmetry, i.e. anisotropic spin splittings [7].

[1] S.R. Park et al., Phys. Rev. Lett. 107, 156803 (2011)
[2] J.-H. Park et al., Phys. Rev. B 85, 195401 (2012)
[3] V. Sunko et al., Nature, 549, 492 (2017)
[4] D. Go et al., Phys. Rev. Lett. 121, 086602 (2018)
[5] M. Ünzelmann et al., Nat. Commun. 12, 3650 (2021)
[6] M. Ünzelmann et al., Phys. Rev. Lett. 124, 176401 (2020)
[7] B. Geldiyev et al. (submitted)