Electronic structure study of a uranium-based material using angle-resolved photoemission spectroscopy

Sabin Regmi[1], Alexei Fedorov[2], Dariusz Kaczorowski[3], Peter Oppeneer[4], Krzysztof Gofryk[1]

[1]*Center for Quantum Actinide Science and Technology, Idaho National Laboratory, Idaho Falls, Idaho 83415, USA*
[2]*Advanced Light Source, Lawrence Berkeley National Lab, Berkeley, California 94702, USA*
[3]*Institute of Low Temperature and Structure Research, Polish Academy of Sciences, ul. Okólna 2, 50-422 Wrocław, Poland*
[4]*Department of Physics and Astronomy, Uppsala University, P. O. Box 516, Uppsala SE-751 20, Sweden*

The study of the electronic structure of *f*-electron strongly correlated systems is a topic of substantial research interest due to the intriguing phenomena they exhibit, such as heavy fermion behavior and unconventional superconductivity, as well as their relevance in quantum and nuclear technologies. 5*f*-electron systems, in particular, present a captivating topic of study because of the unique duality of the 5*f*-electrons. This duality has been a challenge in understanding their relation to the physical phenomena and Fermi surface topology. Angle-resolved photoemission spectroscopy (ARPES) is a state-of-the-art tool that allows direct visualization of the electronic structure of crystalline solids. Here, we present the ARPES study of a uranium-based 5*f*-electron system, supported by density-functional theory calculations. The results unveil the nature of 5*f* electrons, their hybridization with conduction electrons, and overall electronic structure of this material. This study will advance the fundamental understanding of the electronic structure of uranium-based and actinide materials in general.

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