Become part of the Cluster of Excellence **ct**.*qmat*. Established in 2019, the Würzburg-Dresden Cluster **ct**.*qmat* is a leading international center for research on topological and complex quantum matter. Our aim is to develop a deep understanding of quantum phenomena in general and to identify materials in which those phenomena are observed in the laboratory. The chair "Experimentelle Physik 4" at the **Julius-Maximilians University (JMU) Würzburg, Germany,** is offering from the next possible date on a position as

Postdoc

to work on **"*Topological Superconductivity and Skyrmion Spin Textures in $SrIrO_3$-Based Layered Structures*"**.

Introduction:

The layered iridate Sr_2IrO_4 has recently been proposed to exhibit unconventional and, in particular, topological superconductivity upon *n*- and *p*-doping, respectively. Sr_2IrO_4 is the n=1 member of the so-called Ruddlesden-Popper phases, $Sr_{n+1}Ir_nO_{3n+1}$, where spin and orbital degrees of freedom are highly entangled, resulting in narrow bands susceptible to correlations. With varying *n* the dimensionality can be tuned, and the system is driven from a spin-orbit Mott insulator towards the correlated metal phase. In a recent angle-resolved photoemission (ARPES) and theory paper [PRL **119**, 256404 (2017)], we have shown that monolayer thick $SrIrO_3$ actually mimicks the electron dispersions of Sr_2IrO_4.
Another interesting transport phenomenon, related to *real space* topological spin structures, is the so-called topological Hall effect in $SrRuO_3$-$SrIrO_3$ bilayers. Recently, it has been suggested that at the interfaces skyrmions may form induced by the Dzyaloshinskii-Moriya interaction as a consequence of the broken inversion symmetry and the strong spin orbit-coupling of $SrIrO_3$ and give rise to the observed, anomalous transport behavior.

The project:

The successful candidate will conduct a systematic quest for superconducting phases in monolayer thick $SrIrO_3$ by *n* and *p* doping, where correlations are expected to play a particularly relevant role, as well as for skyrmion spin structures in $SrRuO_3$-$SrIrO_3$ bilayers. Besides *in* and *ex situ* transport and gating experiments *in operando* spectroscopic and microscopic investigations using ARPES and – in collaboration with our partners in Dresden – advanced transmission electron microscopy techniques, respectively, will constitute a central part of the research activities.

What to expect from us and what we expect from you:

When joining our group you will enjoy an inspiring and international environment at one of the worldwide hotspots for topological and correlated quantum matter. Embedded in the Würzburg-Dresden Cluster of Excellence (ct.qmat) and the Würzburg Collaborative Research Center (TocoTronics), you work in a creative, open-minded team that is committed to gain new insight in the design of oxide quantum materials and their potential for applications in future quantum technology. As part of the project, you will have the chance to perform experiments at national and international synchrotron radiation facilities.
For this sophisticated project we look for an experienced postdoc with expertise in epitaxial growth of few monolayer thin oxide films by pulsed laser deposition as well as in (photoelectron) spectroscopy and transport measurements on gated architectures.

Scientific Contact: Michael Sing (sing@physik.uni-wuerzburg.de) or Ralph Claessen (claessen@...)
Homepage: https://www.physik.uni-wuerzburg.de/ep4/home/

Cluster Contact: Mail us at jobs.ct.qmat@listserv.dfn.de or visit our homepage www.ctqmat.de

Stand: 21.06.2020