RWTH Aachen Physik

AG Prof. M. Morgenstern

Inst. IIB

Master Thesis

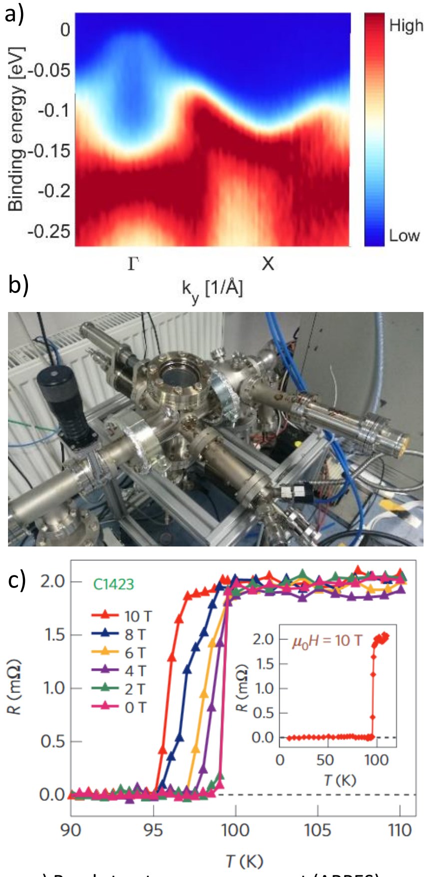
Epitaxial Growth of FeSe on $SrTiO_3$ and on the Topological Insulator $(Bi_{1-x}Sb_x)_2Te_3$

Over the last years one of the most frequently investigated materials in solid state physics is FeSe. A single monolayer grown on top of $SrTiO_3$ shows an outstandingly high critical temperature of T_c=109K below which the material is superconductive. Combined with the simple stoichiometry, it is the ideal material to study iron based superconductors and can also be used in the search for so called Majorana fermions (fermions that are their own anti-particles) in a solid state system. These exotic particles can be found at the interface of a topological insulator e.g. $(Bi_{1-x}Sb_x)_2Te_3$ and a superconductor.

A small molecular beam epitaxy (MBE) chamber for the FeSe growth has already been constructed and first films have been successfully grown.

Your task is the continuation of this work with the goal of growing a superconductive film on a topological insulator, which will be analyzed by photoelectron spectroscopy and scanning tunneling microscopy. For this purpose, you will participate in two different scientific groups (group of M. Morgenstern in Aachen and PGI-6 in Jülich) and come in contact with many different measurement techniques, e.g. XPS, ARPES, MBE, AFM, STM and LEED.

You can start immediately.



a) Band structure measurement (ARPES) of 6nm thick FeSe/$SrTiO_3$ grown in the chamber shown in b). c) Superconductivity in FeSe. image taken from *Nature Materials* **14,** 285–289 (2015)

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14.05.2018