Superconductivity and magnetism in complex mercury-based compounds

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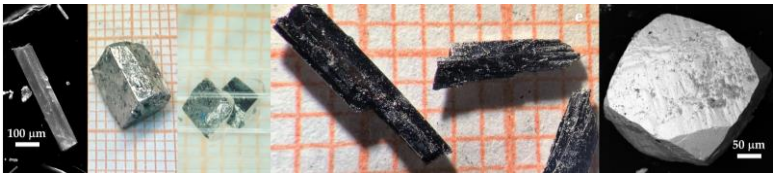
Mercury, in both elemental form and as part of compounds and amalgams has played an important role in solid-state chemistry and condensed matter physics [1-3]. However, much care must be taken both during synthesis as well as during characterization of this peculiar element and its compounds – from toxicity concerns to high chemical reactivity – these systems pose several experimental challenges. In this talk, I will showcase that, nonetheless, mercury-based materials offer unique crystallographic motifs and, as a result, peculiar physical properties. In particular, I will concentrate on the binary compounds of mercury and lanthanide as well as actinide elements, which have so far been under investigated [4-7]. Using a unique laboratory environment, we are able to synthesize single crystals of several binary phases (see below) and study their properties in detail. By looking at the evolution of crystallographic complexity across several series of compounds, I will discuss how intrinsic crystal chemistry affects the resultant ground states.



[1] F. Merlo and M. L. Fornasini, *J. Less-Common Met.*; **1979**; 64; 221.

[2] F. Tambornino and C. Hoch, *Zeitschrift Fur Anorg. Und Allg. Chemie*; **2015**; 641; 537.

[3] C. Hoch and A. Simon, *Angew. Chemie Int. Ed.*; **2012**; 51; 3262.

[4] E. Svanidze, A. Amon, R. Borth, Yu. Prots, M. Schmidt, M. Nicklas, A. Leithe-Jasper, and Yu. Grin, *Phys. Rev. B*; **2019**; 99; 220403.

[5] Yu. Prots, M. Krnel, Yu. Grin, and E. Svanidze, *Phys. Rev. B*; **2022**; 106, L060412.

[6] Yu. Prots, M. Krnel, Yu. Grin, and E. Svanidze, *Inorganic Chemistry*; **2022**; 61, 15444.

[7] K. Witthaut, Yu. Prots, N. Zaremba, M. Krnel, M. Schmidt, A. Leithe-Jasper, Yu. Grin, *Organic and Inorganic Au*; **2023**; 3; 143.