Sonderforschungsbereich TRR 160

Kohärente Manipulation wechselwirkender Spinanregungen
in maßgeschneiderten Halbleitern

Seminarankündigung

Donnerstag, 12.05.2022, 12:00 Uhr
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https://trr160.tu-dortmund.de/teaching/icrc-trr-160-seminar/

"Single crystal growth of Eu-based intermetallic compounds with strong electron-lattice coupling"

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Abstract:

The study of collective phenomena raising from enhanced coupling between electrons and phonons is focused on materials which exhibit phase transitions involving both, electronic and lattice-degrees of freedom. One system providing such a strongly coupled phase transition is EuPd2Si2 of the ThCr2Si2 structural type. This compound shows a temperature induced valence transition of europium between the energetically vicinal valence states Eu2+ and Eu3+ at about 170 K which is connected to a strong change in the a lattice parameter. First reports on the synthesis of single crystals came up only recently, but a deep investigation of the valence transition in this compound is still missing, especially the location of the system in the generalized phase diagram is under investigation. We aime to tune the system by negative chemical pressure towards a possible second order critical endpoint in this phase diagram via substitution of Si by Ge.
For the successful growth of mm-sized single crystals of EuPd2Si2, we applied the Czochralski method using a levitating melt under enhanced Ar pressure. Recently, this procedure was developed and successfully applied to the single crystal growth of the ferromagnetic quantum-critical compound YbNi4P2. In this talk, we will present the characterization of EuPd2Si2 crystals as well as of the Ge substituted system and some preliminary physical characterization around the valence transition. The combination of careful chemical and structural analysis with magnetization and transport measurements shows that EuPd2Si2 grows in a homogeneity range and that the physical properties are very sensitive to tiny changes in the composition of the sample.