



TRR 80 Seminar

Am Dienstag, den 30. Mai um 16:00 Uhr

spricht

Prof. Dr. Takahiro Onimaru

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über das Thema

Exotic Quadrupolar Phenomena in Non-Kramers Doublets of Pr 1-2-20 Systems

A variety of exotic phenomena arising from active quadrupoles in non-Kramers doublet of $4f^2$ systems, $\text{PrT}_2\text{X}_{20}$ (T : transition metal, X : Al, Zn, and Cd), are briefly presented. $\text{PrT}_2\text{X}_{20}$ crystallizes in the cubic $\text{CeCr}_2\text{Al}_{20}$ -type structure, where the Pr^{3+} ion is encapsulated in a symmetric cage formed by sixteen X atoms.[1] The cubic point group of T_d at the Pr site may bring about a degenerated $4f^2$ crystalline electric field (CEF) ground state. Furthermore, the s - p orbitals of cage atoms would hybridize with the $4f^2$ state. In fact, the CEF ground states of Pr^{3+} in $\text{PrT}_2\text{X}_{20}$ are the non-Kramers doublet. Since the non-Kramers doublets have no magnetic dipole but quadrupolar degrees of freedom, the transport, thermodynamic and magnetic properties are governed by the purely active quadrupoles of the doublet in a low temperature range below a few K, being lower than a few tens K of the CEF splitting energy. At the low temperature range, the quadrupoles play a key role to induce the phenomena such as long-range quadrupole order, superconductivity, non-Fermi liquid behavior, and magnetic-field induced heavy fermion state.[2-4] In this talk, I would like to present the systematic understanding on the quadrupole-induced phenomena and progress of the recent researches on them.

[1] T. Nasch et al, Z. Naturforsch. B 52, 1023 (1997).

[2] T. Onimaru et al., Phys. Rev. Lett. 106, 177001 (2011).

[3] A. Sakai and S. Nakatsuji, J. Phys. Soc. Jpn. 80, 063701 (2011).

[4] T. Onimaru and H. Kusunose, J. Phys. Soc. Jpn. 85, 082002 (2016).

Gäste sind herzlich willkommen!

Der Vortrag findet im Seminarraum S-288, Institut für Physik, Universität Augsburg statt.

Gastgeber: Prof. Dr. Philipp Gegenwart
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