Kondo Effect in 3D Topological Insulators

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Abstract

In a recent paper [1] it was shown that when an Anderson impurity (d) is immersed in a bulk 3D topological insulator it gives rise to the formation of in-gap bound state (f). This scenario may be described by an Anderson model with two strongly correlated impurities, d and f where the d impurity is hybridized with the (inverted) band electrons while the f impurity interacts only with the d impurity. In this talk I will present preliminary results pertaining to the corresponding low energy Kondo physics in the weak coupling regime. In particular, distinction with respect the Kondo effect in real metals will be stressed and the analogy with the physics of transport through double quantum dot [2,3] will be employed.

References:

[1] H. F. Lu, H. Z. Lu, S. Q. Shen and T. K. Ng, Quantum impurity in the bulk of topological insulator, arXiv: 1209.4710.

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[3] K. Kikoin, M. Kiselev and Y. Avishai, Dynamical Symmetries for Nanostructures, Springer (2011).

About the speaker

Yshai Avishai is an Emeritus professor of Physics and a member of the Ilse Katz Institute for Nanoscale Science and Technology at the Ben-Gurion University, Beer-Sheva, Israel. He also holds an M.A degree in Economics from the Ben Gurion University.

After earning his PhD in Physics at the Weizmann institute in Rehovot, professor Avishai has been a post doctoral research associate at Argonne National Laboratory and since then he has been affiliated with the Institute de Physique Nucleaire in Lyon, the theoretical physics department and the department of condensed matter physics at Saclay, the University of Strasbourg, The University of Paris Sud at Orsay, the University of Tokyo, the University of Hokkaido, the NTT basic research laboratories and the Hong Kong University of Science and Technology. He is a fellow of the American Physical Society and contemporary Member of the Editorial Board of Physical Review Letters (Condensed matter physics). Dr. Avishai's past research interests concentrated on the few-body problem and scattering theory in Nuclear Physics, but since 1990 they are mainly focused on theoretical condensed matter physics. These include mesoscopic systems, Anderson localization, the quantum Hall effect, quantum percolation, strongly correlated electrons and the Kondo effect.

Professor Avishai is the Editor of the book "Recent Progress in Many-Body Theories", (Plenum, New York, 1990), and a coauthor of two books "Dynamical Symmetries for Nanostructures" by Konstantin Kikoin, Mikhail Kiselev and Yshai Avishai (Springer 2011, 354 pages) and "Quantum Mechanics, with Applications to Nanotechnology and Information Science", by Y. B. Band and Y. Avishai, (Elsevier, 2012, 1010 pages).