

# Novel phenomena in QCD Kondo phase of dense quark matter

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The Kondo effect in metals is induced by a spin exchange interaction between conduction electrons and localized impurities. This effect drastically modify electric/thermal/transport properties of metals at low temperatures. In high-density quark matter, a similar effect can be induced by interactions between light quarks and colored impurities like charm or bottom quarks, which is the so-called QCD Kondo effect. The appearance of such a new type of Kondo effect can change the structure of the QCD phase diagram and heavy-quark transport phenomena.

The nonperturbative region of the Kondo effect can be described by a Kondo condensate composed of a light fermion and a heavy impurity, and the structure of the QCD phase diagram including such a phase is an open question [1,2,3]. In this talk, based on our recent studies, I will review novel phenomena realized in the QCD Kondo phase, such as excited states in the Kondo phase [2,4], a Kondo effect by chirality imbalance [5], contributions by antiparticle impurities [6], an enhancement of the chiral separation effect [7,8], a phase structure in lattice models [9], and a heavy-quark spin polarization [7,10].

- [1] Nucl. Phys. A 983, 90 (2019) [arXiv:1604.07208]
- [2] Phys. Rev. D 96, 014016 (2017) [arXiv:1703.04124]
- [3] Phys. Rev. D 96, 114007 (2017) [arXiv:1708.06930]
- [4] Phys. Rev. Research 2, 023066 (2020) [arXiv:1909.07573]
- [5] Phys. Rev. Research 2, 023312 (2020) [arXiv:1912.12669]
- [6] Phys. Rev. Research 3, 013233 (2021) [arXiv:2008.08434]
- [7] Phys. Rev. Research 3, 023098 (2021) [arXiv:2011.00882]
- [8] Phys. Rev. D 103, 054041 (2021) [arXiv:2012.15173]
- [9] Phys. Rev. D 104, 094515 (2021) [arXiv:2107.07270]
- [10] arXiv:2109.14799

## Present via

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