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Quantum Impurities develop Fractional Local Moments in Spin-Orbit Coupled Systems[1] ADHIP AGARWALA, VIJAY B. SHENOY, Indian Institute of Science Bangalore — Systems with spin-orbit coupling have the potential to realize exotic quantum states which are interesting both from fundamental and technological perspectives. We investigate the new physics that arises when a correlated spin-*1/2* quantum impurity hybridizes with a spin-orbit coupled Fermi system. The intriguing aspect uncovered is that, in contrast to unit local moment in conventional systems, the impurity here develops a *fractional local moment* of *2/3*. The concomitant Kondo effect has a high Kondo temperature (T_K). Our theory explains these novel features including the origins of the fractional local moment and provides a recipe to use spin-orbit coupling(λ) to enhance Kondo temperature ($T_K \sim \lambda^{4/3}$). These results will be useful in shedding light on a range of experiments, including those of magnetic impurities at oxide interfaces. Our predictions can also be directly tested in cold-atom systems where the spin-orbit coupling can be engendered via a uniform synthetic non-Abelian gauge field. In addition, this work opens up new directions of research in spin-orbit coupled Kondo lattice systems. Reference: arXiv:1509.07328

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