**Cascade of strongly correlated states in a partially filled kagome flat band**

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The kagome lattice with spin-orbit coupling exhibits a topologically non-trivial flat band in which the effect of Coulomb interactions between the localized charge carriers is believed to be strong. Hence, material realizations of the kagome lattice provide a promising platform to search for new quantum phases of matter at the confluence of topology and strong electronic correlations. We previously showed that the kagome metal CoSn exhibits a quasi-two-dimensional flat band whose occupied electronic states are strongly localized in real space [1]. Here, we study the low energy density of states of $Co_{1-x}Fe_xSn$ in which partial flat band fillings are realized by hole-doping with Fe. We will present results from temperature-dependent scanning tunneling microscopy measurements on $Co_{1-x}Fe_xSn$. Combining high-resolution spectroscopy with spectroscopic imaging on samples with different doping levels $x$, we observe a rich sequence of states appearing at the Fermi energy that cannot be explained within a single-particle picture. We will discuss our findings in the context of electron-electron interaction induced many body states at partial flat band fillings [2].

We gratefully acknowledge support by the Hong Kong RGC and the Croucher Foundation.

[1] C. Chen et al., *Phys. Rev. Research* ***5,*** 043269 (2023)

[2] C. Chen et al., *under review* (2024)