

Anomalous electrons in a metallic kagome ferromagnet

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We present our work on ferromagnet kagome Fe₃Sn₂ using micro-focused laser-based angle-resolved photoemission spectroscopy (ARPES). Our experiment reveals several results: First, we can observe the twinned domain of this breathing kagome lattice spatially which has not been reported before. Second, upon a closer investigation, we found a quasiparticle that lives near the Fermi level behaving in a marginal Fermi liquid way, usually found in the cuprates system. Lastly, this interesting quasiparticle is also found to share spectral functions with the nearby and similar band, before its disappearance after a subtle energy and temperature change, demonstrating a conservation of quasiparticles between these two bands. We propose a possible mechanism for how this anomalous electron can be formed by involving a nearby flat band located slightly above the Fermi level which leads to a logical conclusion that the electrons are fractionalized between these two bands.

[1] <https://www.nature.com/articles/s41586-024-07085-w>