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## The rich physics of bilayer kagome metals

Long-range electronic order descending from a metallic parent state constitutes a rich playground to study the intricate interplay of structural and electronic degrees of freedom. Kagome materials appeared as the perfect stage for such explorations. Specifically,  $RV_6Sn_6$  ( $R$  = rare earth atom) bilayer kagome metals are topological systems with Dirac-like itinerant states, van Hove singularities and correlated flat bands [1,2]. Interestingly, within this family,  $ScV_6Sn_6$  also features a charge density wave (CDW) phase that affects the susceptibility, the neutron scattering, and the specific heat, and whose motif differs significantly from that of the siblings  $AV_3Sb_5$  ( $A = K, Rb, Cs$ ) and  $FeGe$ . As such, in this presentation, I will give an overview about the rich physics recently unveiled in bilayer kagome metals, and will also discuss about the dynamics of that CDW phase [3]. Specifically, while there is no consensus yet on its microscopic origin, with contradicting affirmations supporting both electron- electron and electron-phonon interaction, we reveal a prominent role played by the structural degrees of freedom in the stabilization of the charge order.

References:

- [1] D. Di Sante et al, Nature Physics 19, 1135 (2023).
- [2] H. Li et al, Nature Physics 20, 1103 (2024)
- [3] M. Tuniz et al, Communications Materials 4, 103 (2023).

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