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Electronic route to stabilize nanoscale spin textures in itinerant frustrated magnets SANJEEV KUMAR, IISER Mohali, SAHINUR REJA, JEROEN VAN DEN BRINK, IFW Dresden, Germany — We unveil novel spin textures in an itinerant fermion model on a frustrated triangular lattice in the limit of low electronic density. Using hybrid Monte Carlo simulations on finite clusters we identify two type of nanoscale spin textures in the background of 120° order: (i) a planar ferromagnetic cluster, and (ii) and a non-coplanar cluster with spins oriented perpendicular to the 120° plane. Both these textures lead to localization of the electronic wavefunctions and are in-turn stabilized by the concomitant charge modulations. The non-coplanar spin texture is accompanied by an unusual scalar chirality pattern. A well defined electric charge and magnetic moment associated with these textures allow for their easy manipulation by external electric and magnetic fields – a desirable feature for data storage. We identify a localization-delocalization behavior for electronic wavefunctions which is unique to frustrated magnets, and propose a general framework for stabilizing similar spin textures in spin-charge coupled systems.

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