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Emergent multipolar spin correlations in a fluctuating spiral - The frustrated ferromagnetic S=1/2 Heisenberg chain in a magnetic field, ANDREAS LAUCHLI, Max Planck Institute for Physics of Complex Systems, Dresden, Germany, JULIEN SUDAN, ANDREAS LUSCHER, IRRMA - EPF Lausanne, Switzerland — We present the phase diagram of the frustrated ferromagnetic $S = 1/2$ Heisenberg J_1-J_2 chain in a magnetic field, obtained by large scale exact diagonalizations and density matrix renormalization group simulations. A vector chirally ordered state, metamagnetic behavior and a sequence of spin-multipolar Luttinger liquid phases up to hexadecupolar kind are found. We provide numerical evidence for a novel locking mechanism, which can drive spiral states towards spin-multipolar phases, such as quadrupolar or octupolar phases. Our results also shed new light on previously discovered spin-multipolar phases in two-dimensional $S = 1/2$ quantum magnets in a magnetic field. We conclude by presenting numerical results on the dynamical spin structure factor in the various phases which are valuable in identifying multipolar phases in experiments.

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