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Entanglement and exotic superfluidity in one-dimensional spin-imbalanced lattices[1] VIVIAN FRANÇA, Institute of Chemistry, São Paulo State University — The exotic coexistence of superfluidity and magnetism has been investigated theoretical and experimentally since decades. Among the several ideas and models to describe exotic superconductors the so-called Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) phase stands out. In strongly correlated systems at low temperatures the FFLO state might emerges by the presence of external magnetic fields or by internal polarization as produced by spin-imbalanced populations. Although the FFLO papers are in their 50th birthday and state-of-the-art experiments have been addressed this matter, there have been no unequivocal observations of FFLO superconductivity. We investigate the FFLO superfluid regime in one-dimensional fermionic lattices from a quantum information theory perspective: studying the properties of entanglement. We find that entanglement is non-monotonic with the polarization whenever the lattice is predicted to be an exotic superfluid. We thus propose a simple model for the spin-flip channels involved in the process. Our model is found to allow a very good description of exotic superfluids, while beyond the FFLO regime it reveals a breaking pairs avalanche. Our findings are supported by both density functional theory and density matrix renormalization group calculations.

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