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Dominant superconducting fluctuations in the 1D extended Holstein-extended Hubbard model SHAN-WEN TSAI, University of California, Riverside, KA-MING TAM, Louisiana State University, DAVID K. CAMPBELL, Boston University — The search for realistic 1D models that exhibit dominant superconducting (SC) fluctuations has a long history. In these 1D systems, the effects of commensurate band fillings - strongest at half-filling - and electronic repulsions typically lead to a finite charge gap and the favoring of insulating density wave ordering over superconductivity. We study a model - the extended Hubbard-extended Holstein (EHEH) model - with non-local electron-phonon interactions, in addition to electron-electron interactions. The EHEH model unambiguously possesses dominant superconducting fluctuations at half filling in a large region of parameter space. Using multi-scale functional renormalization group for the full model and a renormalization group for a bosonized form of the model, we prove the existence of dominant SC fluctuations in this model. Dominant SC fluctuations arise because the spin-charge coupling at high energy is weakened by the non-local electron-phonon interaction and the charge gap is destroyed by the suppression of the Umklapp process. The existence of the dominant SC pairing instability in this half-filled 1D system suggests that non-local boson-meditated interactions may be important in the superconductivity observed in high T_c cuprate and organic superconductors.

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