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Spin-Incoherent Luttinger Liquid-Superconductor Hybrid Systems DAGIM TILAHUN, The University of Texas at Austin, GREGORY FIETE, California Institute of Technology — Strongly interacting one-dimensional systems exhibit the exotic property of *spin-charge separation* where a repulsive interaction suppresses the velocity of the spin degree of freedom while enhancing that of the charge. Spin-incoherent Luttinger liquids exist in the regime where the temperature is much higher than the characteristic energy of the spin sector (thermalized, random spins) but much less than that of the charge. We study a hybrid system consisting of a spin-incoherent Luttinger liquid adjoined at one or both ends to a superconductor, and find robust features that can be used as clear experimental signatures of spin-incoherence. We find the tunneling density of states diverges at low energies and exhibits a universal frequency dependence independent of the strength of the interactions in the system. We also find that in spite of exponentially decaying pair correlations with distance into the spin-incoherent Luttinger liquid, the Josephson current remains robust. Compared to the zero temperature Luttinger liquid case there is a factor of 2 reduction in the critical current and a halving of the period in the phase difference between the superconductors. Our results open the way for a new class of experiments in the spin-incoherent regime of one dimensional systems.

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