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Strongly enhanced superconductivity in coupled t–J segments SAHINUR REJA, JEROEN VAN DEN BRINK, SATOSHI NISHIMOTO, IFW Dresden — The t–J Hamiltonian is one of the cornerstones in the theoretical study of strongly correlated copper-oxide based materials. Using the density matrix renormalization group method we calculate the phase diagram of the one-dimensional (1D) t–J chain in the presence of a periodic hopping modulation, as a prototype of coupled-segment models. While in the uniform 1D t–J model near half-filling superconducting (SC) state dominates only at unphysically large values of the exchange coupling constant $J/t > 3$, we show that a small hopping and exchange modulation very strongly reduces the critical coupling to be as low as $J/t \sim 1/3$ – well within the physical regime. The phase diagram as a function of the electron filling also exhibits metallic, insulating line phases and regions of phase separation. We suggest that a SC state is easily stabilized if t–J segments creating local spin-singlet pairing are coupled to each other – another example is ladder system.

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