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Critical behavior of the 1D Lévy lattice spin-glass: from mean-field threshold to the effective lower critical dimension[1] LUCA LEUZZI, IPCF-CNR, Italy, GIORGIO PARISI, FEDERICO RICCI-TERSENGHI, Dept. Physics, Sapienza University of Rome, Italy, JUAN-JOSÉ RUIZ-LORENZO, Dept. Physics, University of Extremadura, Badajoz, Spain — By means of Monte Carlo numerical simulations we analyze the critical behavior of a one dimensional spin-glass model with diluted interactions decaying, in probability, as an inverse power of the distance: the Lévy lattice spin-glass. Varying the power ρ, corresponds to change the effective dimension from mean-field-like (small power $\rho < 4/3$) to finite dimensional-like short-range models ($< 4/3\rho < 2$) and, eventually, to 1D short-range models ($\rho > 2$), where no phase transition occurs. The bond diluteness drastically reduces the computational time and large sizes can be approached. The one dimensionality allows for studying long systems, e.g., long correlation lenghts in the critical region. The spin-glass critical behavior can, therefore, be studied in and out of the range of validity of the mean-field approximation. After reviewing the main results in the Lévy lattice model about the spin-glass transition and the nature of the spin-glass phase for different values of the effective dimension, we will present new results on the critical behavior at $\rho = 2$, corresponding to the lower critical dimension, and compare them with old and recent renormalization group approaches in this limit.

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