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Quantum mechanical toolbox to study the dirty crossover in cold atomic gases[1] B. TANATAR, Department of Physics, Bilkent University, 06800, Ankara, Turkey, AYAN KHAN, Bilkent University, Department of Physics, 06800, Ankara, Turkey, SAURABH BASU, Department of Physics, Indian Institute of Technology-Guwahati, Guwahati, India — We consider an ultracold atomic gas exhibiting the BCS-BEC crossover as the short-range interaction strength (characterized by the scattering length) is increased. In particular, we investigate the dirty crossover (for a disoredered gas) by means of the fidelity susceptibility (FS). Fidelity susceptibility is related to the overlap between the ground states of different phases. The disorder is incorporated in the mean-field formalism through Gaussian fluctuations. We observe a rise of asymmetric nature in the FS with increasing disorder which might be an indication for an impending quantum phase transition (QPT). We analyze our results for the FS and the density of states using the statistical tools such as skewness and kurtosis.

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