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Zeros of the dispersion relation of the elementary excitation and the correlation length of strongly correlated quantum systems YUICHI NAKAMURA, Dept. of Phys, the Univ. of Tokyo — We argue that the imaginary part of a zero of the dispersion relation of the elementary excitation of quantum systems is equal to the inverse correlation length. We confirm the relation for the Hubbard model[1] in the half-filled case; it has been confirmed only for the S=1/2 antiferromagnetic XXZ chain[2]. In order to search zeros of the dispersion relation in the complex momentum space efficiently, we introduce a non-Hermitian generalization of quantum systems by adding an imaginary vector potential ig to the momentum operator[3]. We also show for the half-filled Hubbard model the reason why the non-Hermitian critical point[4] is equal to the inverse correlation length[5] by noting the dispersion relation of the charge excitation.
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