Renormalization group study of bond order wave phase in the extended Hubbard chain KA MING TAM, SHAN-WEN TSAI, DAVID K. CAMPBELL, Boston University — We study the phase diagram of the half-filled one-dimensional extended Hubbard model at weak coupling. We obtain a finite region of bond charge density wave order near $U = 2V$ using one loop renormalization group (RG) method. We solve a long-standing controversy in this field, explaining why earlier standard g-ology calculations have not found this phase. We introduce a functional generalization of standard g-ology in which effects of the scattering processes involving electrons away from the Fermi points are included in a systematic way. We argue that this is an example in which formally irrelevant terms change the topology of the phase diagram. We discuss other scenarios in which this may occur and this generalized RG method is essential to fully characterize the phase diagram.

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