Bipartite entanglement and localization of one-particle states Haibin Li\textsuperscript{(1,2)}, Xiaoguang Wang\textsuperscript{(1,3)}, and Bambi Hu\textsuperscript{(1,4)} 1. Department of Physics and Center for Nonlinear Studies, Hong Kong Baptist University, Hong Kong, China. 2. Zhejiang Institute of Modern Physics, Zhejiang University, Hangzhou 310027, China. 3. Department of Physics and Australian Centre of Excellence for Quantum Computer Technology, 4. Department of Physics, University of Houston, Houston, Texas 77204-5005, USA.

abstract We study bipartite entanglement in a general one-particle state, and find that the linear entropy, quantifying the bipartite entanglement, is directly connected to the participation ratio, characterizing the state localization. The more extended the state is, the more entangled the state. We apply the general formalism to investigate ground-state and dynamical properties of entanglement in the one-dimensional Harper model.