The temperature of a single chaotic eigenstate

The onset of thermalization in a closed system of randomly interacting bosons, at the level of a single eigenstate, is discussed. We focus on the emergence of Bose-Einstein distribution of single-particle occupation numbers and give a local criterion for thermalization. We show how to define the temperature of an eigenstate, provided that it has a chaotic structure in the basis defined by single-particle states. The analytical expression for the eigenstate temperature as a function of the inter-particle interaction and energy is complemented by numerical data. The relation of thermalization to the many-body localization transition is discussed.