

Non-ergodic and insulating phases of Josephson Junctions Arrays

M. Pino

*Ístituto de física fundamental, Serrano 113 b 123,
28006 Madrid, Spain,
mpg@iff.csic.es.*

We show that chaotic dynamic may not result in thermalization in certain bosonic model that can be realized as an array of Josephson junctions. This model exhibits a many-body localization transition which separates insulating and metallic phases. Localization prevents the system to show thermal behaviour in the Many-Body localized phase. We argue that there is a intermediate region in the phase diagram, between Many-Body localized and ergodic phases, in which the system behaves as a metal but exhibits non-thermal properties.

[1] M. Pino, L. B. Ioffe, and B. L. Altshuler, PNAS 2016 113 (3) 536-541, 2015, doi:10.1073/pnas.1520033113.

[2] M. Pino, V. E. Kravtsov, B. L. Altshuler and L. B. Ioffe, arXiv:1704.07393 (2017).

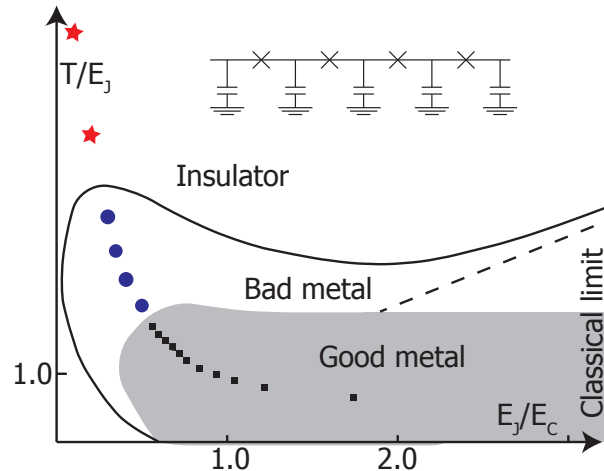


Figure 1: Phase diagram of one dimensional Josephson junction array. The MBL phase transition separates the non-ergodic bad metal with exponentially large but finite resistance from the insulator with infinite resistance. Cooling the non-ergodic bad metal transforms it into a good ergodic metal. The points show approximate positions of the effective T/E_J for the quantum problem with a finite number of charging states. The red stars indicate insulator, blue circles bad metal, and squares good metal.