

SEMPARIS – Séminaires en région parisienne

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Séminaire Matériaux et Dispositifs Quantiques du LPENS

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Domaines : cond-mat

Titre : *Josephson junction metamaterials : quantum simulation and metrology*

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Résumé : *Given their weak dissipation, large non-linearity and versatility, Josephson junction metamaterials constitute a promising platform to explore a large class of physical phenomena, from quantum phase transitions to non-linear quantum optics in the microwave domain. In this talk I will discuss two recent experiments. First, I will report on the measurement of a fully-tunable model system where a long chain of several thousands linear Josephson elements, acting as a strongly dissipative environment, is terminated by a small Josephson junction endowed with a strong non-linearity, acting as a single impurity. Using this quantum simulator we could test predictions of the Boundary Sine Gordon model, including non-perturbative renormalization of the Josephson energy or many-body dissipation. It is interesting to note that, in some parameter ranges, the explanation of our data exceeds the capabilities of the most advanced many-body numerical techniques. Then, I will discuss our observation of quantized current steps in the current-voltage characteristic of these Josephson junction metamaterials and their interpretation in the context of Bloch oscillations and quantum metrology.*
