

Contribution ID: 35

Type: **Talk**

A negative-index Josephson metamaterial: wave mixing and beyond

Thursday 8 May 2025 11:15 (30 minutes)

Since their initial proposal, materials with a negative refractive index, also dubbed as left-handed, have attracted significant interest because of their unusual electromagnetic properties and promising technological applications. Recently, they have gained renewed attention in the field of circuit quantum electrodynamics as potential platforms for achieving near-quantum-limited parametric amplification. I will discuss the first realization of a negative-index Josephson metamaterial that supports propagating waves. The Josephson junctions nonlinearity, together with the left-handed dispersion, where phase and group velocity have opposite signs, enables various parametric processes, ranging from self-phase-matched broadband amplification to both frequency conversion and amplification of counter-propagating waves. Beyond these nonlinear optical effects, negative-index Josephson metamaterials also offer opportunities to explore new phenomena in quantum optics. I will describe a recent experiment in which we observed the generation of entangled photons propagating in opposite directions within such a metamaterial.

Presenter: CAPPELLI, Giulio (CNRS Institut Néel)