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Phase-coherent engineering of electronic heat currents with a Josephson modulator. ANTONIO FORNIERI, CHRISTOPHE BLANC, RICCARDO BOSISIO, SOPHIE D'AMBROSIO, FRANCESCO GIAZOTTO, NEST, Instituto Nanoscienze-CNR and Scuola Normale Superiore — In this contribution we report the realization of the first balanced Josephson heat modulator designed to offer full control at the nanoscale over the phase-coherent component of electronic thermal currents.[1] The ability to master the amount of heat transferred through two tunnel-coupled superconductors by tuning their phase difference[2] is the core of coherent caloritronics, and is expected to be a key tool in a number of nanoscience fields, including solid state cooling, thermal isolation, radiation detection, quantum information and thermal logic. Our device provides magnetic-flux-dependent temperature modulations up to 40 mK in amplitude with a maximum of the flux-to-temperature transfer coefficient reaching 200 mK per flux quantum at a bath temperature of 25 mK. Foremost, it demonstrates the exact correspondence in the phase-engineering of charge and heat currents, breaking ground for advanced caloritronic nanodevices such as thermal splitters, heat pumps and time-dependent electronic engines.

[1]A. Fornieri *et al.*, arXiv:1507.00199, to be published in *Nature Nanotechnology*.
[2]F. Giazotto and M.-J. Martínez-Pérez, *Nature* **492**, 401-405 (2012).

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