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. The ability to master the amount of heat transferred through two tunnel-coupled superconductors by tuning their phase difference 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.