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Large tunable thermoelectric effects in superconducting spin valves

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A tunable cryogenic thermoelectric generator needs a high conversion factor between electricity and heat and a large change in the thermoelectric output when switching the magnetic state of the device. Recent studies have revealed magnetically controllable thermoelectric effects in superconductor/ferromagnet (S/F) structures. However, the reported modifications in thermoelectric power are either minimal, involve superconductors with relatively low critical temperatures (below 1K), or do not utilize commercially available spintronic materials.

Here, I will present a joint theoretical and experimental work, where I have done the theoretical calculations and our collaborators have performed the experiment. We demonstrate large tunable thermoelectric effects in superconducting spin valves with commercially available materials. These findings pave the way for the development of efficient and versatile cryogenic thermoelectric heat engines.

Authors: SANCHEZ, Carlos; GONZALEZ-RUANO, César; G. ALIEV, Farkhad; LINDER, Jacob; BRATLAND TJERNSHAUGEN, Johanne (NTNU); TUERO, Pablo; LU, Yuan

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