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# A compact and efficient ReBCO actuator

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This study evaluates the performance of a superconducting linear-actuator demonstrator that is based on a ReBCO layer-wound solenoid. The solenoid geometry was chosen in view of ease of manufacturing and scalability. Compared to a similarly-sized copper actuator with the same power consumption, the demonstrator is designed to generate a force that is 2 orders of magnitude greater. It comprises a ReBCO solenoid stator and a concentric permanent magnet mover within in a mug-sized cylindrical envelope. When operated in boiling liquid nitrogen, a steady-state force of 300 N is targeted with a coil-level power consumption in the order of 1 mW.

High-tech industry and cryogenic optical components require precise and efficient linear actuators. In terms of efficiency and heat load, power-dense HTS-based superconducting actuators perform at least an order of magnitude better than conventional ones, due to the lack of ohmic dissipation. Applications like cryogenic mirrors and detectors, where thermal load needs to be kept at a minimum, may benefit greatly from this technology.

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