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PENeLOPE: testing a one-of-a-kind neutron storage magnet

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Neutrons have a magnetic moment of around 60 neV/T. The force on this magnetic dipole moment in a gradient field can be used to manipulate or store so called ultracold neutrons (UCN), free neutrons with very small kinetic energy and velocity. To create a magnetic storage vessel, one has to create a low field region surrounded by a high field region; only one spin state of the neutrons can be confined. These traps can be used to resolve the ongoing puzzle of the neutron lifetime more than 70 years after its discovery.
To this end, a large superconducting storage magnet has been developed at Technische Universität München and is built by Babcock Noell. It consists of 24 stacked thick and short solenoids creating a toroidal storage volume.
Several technical challenges arise from the coil topology: each adjacent solenoid has alternating current direction, leading to huge repelling forces. In addition, the space for support structure is very limited. This makes an extensive development and testing campaign necessary. The main features and status of the magnet along with results from coil tests will be presented.

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