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Measuring antimatter gravity in the ALPHA-g magnetic trap

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The ALPHA-g experiment at CERN aims to undertake the first ever precision measurement of the gravitational mass of antihydrogen atoms, by releasing them from a gravity-compensated magnetic minimum trap. The magnetic minimum trap is nominally created by an octupole and two mirror coils. However, in order to achieve the level of magnetic control required to resolve gravity to the 1% level and beyond, many other magnetic elements are involved to tailor and correct the trap field to the O(10^-5) level, as well as to manipulate and cool the anti-atoms before the measurement. In this talk, we present the construction of the sophisticated, multi-purpose superconducting magnet system designed for this purpose, which composes of 24 coils, 5 overlapping octupole elements and a high-uniformity large volume solenoid. We will also showcase the simulated behaviour of the anti-atoms inside the magnet system, as well as the predicted gravity precision we may achieve under different experimental conditions.

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