

Transportable Cryostat and Permanent Magnet Trap for Transporting Antiprotons

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The ERC Project STE $\bar{P}$, “Symmetry Tests in Experiments with Portable Antiprotons”, targets the development of transportable antiproton traps to enhance the sensitivity of CPT invariance tests with antiprotons that are conducted in the BASE collaboration. To enable antiproton measurements with improved precision, we are commissioning the transportable trap system BASE-STE $\bar{P}$ in the AD/ELENA facility, so that future measurements can be conducted outside of the Antiproton Decelerator hall at CERN to circumvent limitations by magnetic field fluctuations.

To achieve this, BASE-STE $\bar{P}$ uses a transportable superconducting magnet with 1 T field strength with a two-stage Penning trap system on a portable experiment frame.

In addition, we designed a transportable cryostat, a combination of a pulse-tube cooler and liquid helium tank to cool a Penning trap system down to 4K even during transportation. The transportable cryostat has a mechanical support structure for all cryogenic parts to withstand the mechanical stress of transportation on the road. For the magnetic field necessary to trap protons and later on antiprotons we want to use a permanent magnet system as an alternative approach to using a superconducting magnet.

In this presentation I will motivate the need for BASE-STE $\bar{P}$ and characterize the set-up of the transportable cryostat and the permanent magnet system.

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