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Construction and tests of image-current detection systems for the transportable antiproton trap BASE-STEP

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The ERC project STEP "Symmetry Tests in Experiments with Portable Antiprotons"is building a transportable antiproton trap BASE-STEP to relocate antiproton precision measurements and ultimately improve the limits of the measurement precision of CPT invariance tests comparing the fundamental properties of protons and antiprotons. Recently, the BASE collaboration "Baryon Anti-baryon Symmetry Experiment"performed the most precise antiproton measurements at CERN in the antiproton decelerator (AD) hall, and we develop the transportable antiproton trap BASE-STEP to move the antiproton outside of CERN's AD hall to reduce limitations caused by magnetic field fluctuations. We will place a trap system with the superconducting magnet in the AD hall to take the ELENA beam to commission BASE-STEP.

I have developed and tested image current detectors for the BASE-STEP. The image current detection systems which I developed and tested are made up of superconducting toroidal coils and cryogenic amplifiers. As a result, I was able to achieve a higher Q-value for the cyclotron detectors with toroidal coils than we had previously achieved using solenoids.
The image-current detection systems that I developed are essential parts of the transportable trap and will help detect trapped particles at various frequencies in a superconducting magnet at CERN and a permanent magnet trap at the University of Mainz.

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