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【288】 Development and Optimization of a Field-Emission based Electron Gun for Low Energy Electron Cooling at ELENA

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This study explores Carbon Nanotubes (CNTs) as a colder electron source for electron cooling in the ELENA decelerator. Currently, a thermionic tungsten-doped BaO cathode limits the cooling efficiency due to a high transverse energy spread. Investigating field emission (FE) aims to achieve a colder antiproton beam, enhancing trapping efficiency for antimatter experiments. Although CNT-based FE feasibility is studied, full characterization for this application is missing. Multiwalled, vertically aligned (VA) CNT arrays with a honeycombed pattern show promising current densities. A Cold Cathode Test Bench (CCTB) was built to fully characterize different samples and to measure the properties of an electron gun using a larger (4x4cm) VACNT array as its source.

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