

Abstract Submitted
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Instrumentation Upgrades to TITAN's Cooler Penning Trap¹

DANIEL LASCAR, TRIUMF, TITAN COLLABORATION — The use of Highly Charged Ions (HCIs) is critical to improving the precision of Penning trap mass measurements of nuclides with half-lives substantially less than 100 ms, but the process of charge breeding imparts an unacceptably high energy spread to the ion bunch sent to TITAN's precision Penning trap for mass measurement. TITAN's Cooler Penning Trap (CPET) at TRIUMF in Vancouver, Canada was designed to cool HCIs with a plasma of simultaneously trapped electrons. CPET is currently undergoing commissioning offline at TRIUMF. In order to prepare CPET for full operation, several technical challenges associated with the use of electrons in a strong magnetic field had to be overcome. First among these was the detection of electrons outside of CPET. A novel, thin charge-collecting detector was successfully developed. Known as the mesh detector, it is charge-agnostic and can be made effectively transparent to allow for the passage of any charged particle at the user's request. The second challenge, moving CPET's electron source off the central beam axis was overcome by the creation of an electron source which would allow for electron injection into CPET and the passage of cooled ions out of CPET. CPET's 7 T solenoid generates a stray field far outside of the magnet's central bore that forced the design of a set of electron injection optics that bend, steer and focus the beam in three dimensions. Results from the successful installation of these upgrades as well as a report on future work will be discussed.

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