

Contribution ID: 42

Type: Poster Presentation

Design and First Tests of a Cathode Ion Detector at Z (CIDZ) to Measure Positive Ion Current at the Convolute on the Z Machine

Wednesday 6 June 2018 13:30 (1h 30m)

There is a significant effort to measure current losses on the Z machine at different points along the magneticallyinsulated transmission line (MITL). The convolute region is one of the key locations where models, measurements, and simulations say much of this current loss occurs. Positive ions comprise one component of this current loss in addition to electrons and negative ions crossing the A-K gap. We have developed a diagnostic to detect protons that cross the A-K gap directly across from the convolute anode posts. We call this diagnostic CIDZ for Cathode Ion Detector on Z. The first iteration of CIDZ included radiochromic films (RCF) that measures the time-integrated ion fluence. On the first "Power Flow"Z shot series, we successfully fielded this design and measured an ion signature. Subsequent calibration of the RCF films suggests that the ion fluence was around 1x1012 protons/cm2. There was strong evidence of partial magnetic insulation of the ion beam. The second iteration of CIDZ attempted to include faraday cups to collect a time-resolved measurement equivalent in addition to nearby RFC film with slots to allow for more ions to impact the film. Unfortunately this design suffered from heavy debris impact and a large external cable pickup due to impact from free-electrons outside of CIDZ. A refined design will include additional cable shielding.

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.

Author: Dr WEBB, Timothy (Sandia National Laboratories)

Co-authors: LAITY, George; MOORE, James; ARAGON, Carlos; HANSON, Joseph **Session Classification:** Poster 3 - Power Modulator Systems and Applications