Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Design and construction of Faraday cup ion detectors using thin film deposition[1] GREGORY SZALKOWSKI, Princeton Plasma Physics Laboratory, Georgia Institute of Technology, DOUGLASS DARROW, Princeton Plasma Physics Laboratory, ED CECIL, Colorado School of Mines — Thin film Faraday cup detectors can provide measurements of fast ion loss from magnetically confined fusion plasmas. These multilayer detectors resolve the energy distribution of the lost ions in addition to giving the total loss rate. Past detectors were assembled by stacking discrete foils and insulating sheets. Outlined here is a design and fabrication methodology for those detectors using thin film deposition. The intention is to use detectors fabricated by this method on JET and NSTX-U. The detectors will consist of alternating layers of aluminum and silicon dioxide. The thicknesses of the films have been designed to isolate energies of interest. Thin film deposition offers the advantage of relatively simple and more mechanically robust construction compared to other methods, as well as precise control of film thickness. Furthermore, this depositional fabrication technique places the layers in intimate thermal contact, providing for 3D conduction and dissipation of the ion-produced heating in the layers rather than the essentially 2D heat conduction in the discrete foil stack implementation.

[1]This work supported by US DoE contract DE-ACO2-09CH11466 and Office of WDTS: Science Undergraduate Laboratory Internship.

Gregory Szalkowski
Princeton Plasma Physics Laboratory, Georgia Institute of Technology

Date submitted: 12 Jul 2013 Electronic form version 1.4