Final technical progress report

U.S. Dept. of Energy, DE-FG03-95ER54303

"A thin foil Faraday collector as a lost alpha detector for high yield d-t tokamak fusion plasmas."

1995-2011

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June 30, 2011

This report summarizes the accomplishment of sixteen years of work toward the development of thin foil Faraday collectors as a lost energetic ion diagnostic for high temperature magnetic confinement fusion plasmas. Following initial, proof of principle accelerator based studies[1,6,8,11] , devices have been tested on TFTR[5], NSTX[10,12,15], ALCATOR[14], DIII-D[14,23], and JET (KA-1[3,9] and KA-2[17, 21, 22, 24]). The reference numbers refer to the attached list of publications. The JET diagnostic KA-2 continues in operation and hopefully will provide valuable diagnostic information during a possible d-t campaign on JET in the coming years. A thin Faraday foil spectrometer, by virtue of its radiation hardness[14], may likewise provide a solution to the very challenging problem of lost alpha particle measurements on ITER and other future burning plasma machines.[20]. This work has benefitted from extensive collaboration. The collaborators include Neil Jarvis, Piet van Belle, Guy Sadler, Vasily Kiptily, Doug Darrow, Bob Ellis, Alan Horton, Keith Fullard, Bill Heidbrink, Sid Medley and Earl Marmor. In addition we gratefully acknowledge the cooperation and support of Darlene Markevich and Erol Okley both recently retired from the Office of Fusion Energy Sciences at the U.S. Department of Energy

Project Publications

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