

Abstract Submitted
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ARRIBA: A novel in-situ plasma surface interaction diagnostic for magnetic fusion devices¹ SOREN HARRISON, Fusion Research Technologies, DENNIS WHYTE, Massachusetts Institute of Technology — The results of the development and design of a novel plasma surface interactions diagnostic for fusion experiments are described. The Alpha Radioisotope Remote Ion Beam Analysis (ARRIBA) diagnostic is designed to provide in-situ, time and depth-resolved measurement of element concentrations and H/D/T fuel retention at any surface inside a magnetic fusion device, including those surfaces exposed to significant heat loads such as found in the divertor. A mechanical system retracts and flips cylindrical material samples (diameter $\sim 10\text{mm}$) during a plasma discharge, such that each sample becomes exposed to the plasma. The opposing sample is protected from plasma exposure by the tile and is mechanically positioned for surface analysis. Surface analysis is accomplished using non-destructive ion beam analysis (IBA) techniques: Rutherford Backscattering (RBS), Nuclear Reaction Analysis (NRA) and Elastic Recoil Detection (ERD). We describe the initial laboratory performance tests of the ARRIBA mechanical prototype, the resolution of laboratory erosion/deposition measurements, and the sensitivity of hydrogenic detection measurements. Additionally, we discuss the status of the planned installation on the C-mod tokamak.

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