

New Approaches to Confined Alpha Diagnostics on ITER*

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Three new approaches to obtain information on the confined fast alphas in ITER are proposed. The first technique measures the energetic D and T charge exchange (CX) neutrals that result from the alpha collision-induced knock-on fuel ion tails undergoing electron capture on the MeV D neutral beams planned for heating and current drive. The second technique measures the energetic knock-on neutron tail due to alphas using the lengths of the proton recoil tracks produced by neutron collisions in nuclear emulsions. The range of the 14 to 18 MeV recoil protons increases by ~140 microns per MeV. The third approach would measure the CX helium neutrals resulting from confined alphas capturing two electrons in the ablation cloud surrounding a dense gas jet that has been proposed for disruption mitigation in ITER.

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