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DT-Alpha Particle Loss Measurements in the JET DTE2 Campaign

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Alpha particle confinement is crucial for sustaining burning plasmas and designing future reactor concepts. A multitude of MHD instabilities can lead to wave-particle interactions and transport alpha particles outward from the plasma. These processes are detrimental to plasma self-heating and require further study. JET's 2021 DT-campaign provides new opportunities for alpha particle experiments in ITER-like plasmas with state-of-the-art energetic particle diagnostics and advanced modeling capabilities. This work will present alpha particle loss measurements from JET's Faraday cup fast ion loss detector array and scintillator probe with supporting measurements from neutron and gamma ray diagnostics. Losses from low frequency MHD activity are examined with comments on alpha transport, confinement, and heating in the bump-on tail distribution and "afterglow" scenarios. The measurements are paired with ORBIT-kick simulations with fast ion distributions provided from TRANSP/NUBEAM to fully describe and quantify the loss mechanisms. Through modeling, differences among the fusion born alphas and beam born species are highlighted. The presentation will conclude with suggestions for ITER experimentation and alpha confinement with regards to the JET observed mode activity.

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