

Abstract Submitted  
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**Stimulated Emission of Fast Alfvén Waves within Toroidally Confined Low Beta Fusion Plasmas** JAMES W S COOK, Univ of California - Irvine, RICHARD O DENDY, CCFE, Culham Science Centre, Abingdon, Oxfordshire OX14 3DB, United Kingdom, SANDRA C CHAPMAN, Centre for Fusion, Space and Astrophysics, Department of Physics, Warwick University, Coventry CV4 7AL, United Kingdom — A fast Alfvén wave of initially low energy is shown to be greatly amplified by a new stimulated emission process [J. W. S. Cook, R. O. Dendy, and S. C. Chapman, *Phys. Rev. Lett.* 118, 185001 (2017)]. This extracts energy from a population inversion of fusion-born ions, which is observed to arise naturally in the outer mid-plane of large tokamak plasmas. The inward propagation of a fast Alfvén wave through the outboard edge of a tokamak plasma, in the presence of this fast ion population, is modeled using full orbit kinetic particle-in-cell simulations using the nonlinear self-consistent Maxwell-Lorentz equations. Within the constraints of periodic boundary conditions, and initially uniform density and magnetic field, these simulations demonstrate this novel alpha-particle channelling scenario for the first time.

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