Abstract Submitted
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Study of Polarized ^{3}He Performance in Tokamak Fuel Pellets JIE LIU, University of Virginia — Nuclear fusion has long been considered an ultimate solution for a clean, renewable, and powerful energy production. Despite decades of research, ignition, or self-sustained energy production, has not been reached in any of fusion reactors built so far. The use of spin-polarized fuel in a tokamak reactor would provide a significant boost. It was predicted that the fusion cross section between deuterium (D) and tritium (T) is boosted 50% when both D and T fully polarized along the local magnetic field. However, their polarization survival in a plasma environment has never been tested. An approach was developed to perform a direct test in the DIII-D tokamak in San Diego, using the mirror reaction D + ^{3}He= α+ p. This proof-of-principle experiment would use inertial confinement fusion (ICF) pellets containing either hyperpolarized D (in the form of solid HD) or hyperpolarized ^{3}3He, which would be injected directly into the plasma core. A series of tests were done to demonstrate the ability to fill inertial confinement fusion (ICF) polymer pellets with pressurized polarized ^{3}He, using data acquired with a clinical 1.5-T magnetic resonance imaging (MRI) scanner. Prelimilary results about the polarized ^{3}3He performance in the pellets will be presented in this talk.

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