Abstract Submitted
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Magnetized High-Density Carbon (HDC) ignition capsules: yield enhancement and ignition conditions[1] G. ZIMMERMAN, D. HO, L.J. PERKINS, B. LOGAN, M. RHODES, J. SALMONSON, Lawrence Livermore Natl Lab — Imposing a magnetic (B) field on capsules can turn capsules that either fail or have low yield, because of low 1-D margin or mix, into igniting capsules that give yield in the MegaJoule range. The imposed B field, e.g. 50 T can be amplified by up to O(10^3), in the hotspot, as it is being compressed by the imploding shell. At this high field strength, the gyro radius of α-particles becomes smaller than the hotspot size. Consequently, the heating of the hotspot becomes more efficient. (We have experimentally demonstrated that field strength >30 T can be generated inside a hohlraum.) We give three examples of implosions with HDC ablators that are sub or marginally ignited because of high fuel entropy, low implosion velocity, or high mix. By imposing seed field between 40 – 50 T, all these capsules can generate yield in the MegaJoule range. The MHD stability in these configurations will be discussed. The generalization of Lindl-Widner ignition condition with the inclusion of B field and the dependence of fraction of α energy deposition on ρR will be presented. With the magnitude of B field mentioned here, the ignition condition, or the minimum hotspot ρR required, can be reduced to about 0.2 from 0.3 g/cm^2 for the case without B field.

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