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Comparative Study to Determine an Optimal Material for Tritium Production in a Direct Drive IFE Reactor MARIA ARISTOVA, CHARLES GENTILE, Princeton Plasma Physics Laboratory — An important technical and economic consideration in designing the prospective direct drive inertial fusion energy (IFE) reactor is the determination of a suitable mechanism for tritium breeding. A comprehensive review is undertaken to determine the optimal breeding material, examining two candidate compounds: ${}^{83}\text{Pb}$ - ${}^{17}\text{Li}$ and $(\text{LiF})_2\text{BeF}_2$ (FLiBe). In this study, the compounds are evaluated based on chemical and physical properties, structural requirements, feasibility, hazards, and costs of application. Preliminary results seemed to indicate that FLiBe may be the more practical option, due to its mechanical utility and the relative projected efficacy of blanket design. However, much remains to be investigated, particularly the properties of breeder and structural materials in the specific conditions of a reactor. This evaluation process will require further theoretical modeling as well as practical trial, currently planned in other progenitor reactor designs. This paper will present the results of the analysis of these candidate breeder materials.

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