

HEAVY ION TARGET PHYSICS AND DESIGN IN THE USA*

D.A.Callahan,D.S.Clark,A.E.Koniges,M.Tabak, LLNL,7000EastAve,Livermore,CA,94551

Over the past few years, the emphasis in heavy ion target design has moved from the distributed radiator target [1,2] to the “hybrid” target [3] because the hybrid target allows a larger beam focal spot than the distributed radiator (~5mm radius rather than ~2mm radius). The beam focusing requirements were one of the motivations for going to a larger number of beams (120 beams) in the “Robust Point Design” [4]. The large beam spot of the hybrid target may also allow lower energy, lower mass ions which should reduce the driver cost and size and possibly even allow a modular driver with a small number of separate accelerators. The hybrid target introduces some new target physics issues, however. Most notable is the use of shims to correct asymmetries that result from the ion beam geometry. Since heavy ion accelerators that are capable of experimentally testing these concepts are years away, we are using x-rays produced by a z-pinch on the Sandia Z-machine [5] to test the concept of shims.

In addition to our hohlraum work, we continue to work on capsule design using calculations in both 2-d and 3-d [6] as well as analytic theory to guide the calculations. Gaining a better understanding of the capsule performance is critical if we want to trade capsule margin for lower peak power from the driver.

*This work performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

1. M.Tabak,D.A.Callahan-Miller,Phys.OfPlasmas,5,1895(1998).
2. D.A.Callahan-MillerandM.Tabak,NuclearFusion,39,883(1999).
3. D.A.Callahan,M.C.Herrmann,andM.Tabak,LaserandParticleBeams,20,405(2002).
4. S.S.Yu,et.Al,FusionScienceandTechnology,44,266(2003).
5. G.R.Bennett,et.Al,PhysofPlasmas,10,3717(2003).
6. A.E.Koniges,M.M.Marinak,M.Tabak,M.C.Herrmann, proceedings of the 3rd International Conference on Inertial Fusion Sciences and Applications, Sept 2003, Monterey, CA.