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Magnetic Intervention: Protection for the first wall in a Laser Fusion Chamber[1] J.D. SETHIAN, J.L. GIULIANI, A.M. VELIKOVICH, Plasma Physics Division, Naval Research Laboratory, A.E. ROBSON, Consultant, Naval Research Laboratory, D.V. ROSE, Voss Scientific, A.R. RAFFRAY, University of California, San Diego — One of the challenges in fusion energy is to develop a first wall that can survive the continual onslaught of emissions from the fusion reaction. For direct drive with lasers, 2% of the energy is in x-rays, 28% in ions, and 70% in neutrons. The ions deposit significant energy (88 MJ) in a short distance (5 um). They heat the wall to high temperatures, and the implanted helium ions agglomerate into bubbles that exfoliate the surface. "Magnetic Intervention" uses a cusp magnetic field to guide the radially expanding ions into external dumps. The dumps can be flowing liquid metal. As the ions are born in a field free region, conservation of canonical angular momentum guarantees they do not hit the wall. A 1979 experiment demonstrated the physics (1), and we recently modeled the plasma/field motion. We present the main facets of MI, including ion motion simulations, and designs for the magnets, dumps, and chamber. (1) R. E. Pechacek, et al., Phys. Rev. Lett. 45, 256 (1980).

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