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New routes to higher fusion yields in a plasma focus device ERIC LERNER, AARON BLAKE, DEREK SHANNON, FRED VAN ROESSEL, AHMAD TALAEI, KYLE LINDHEIMER, Lawrenceville Plasma Physics, Inc. — While fusion yield in plasma focus devices scales as I^4 to I^5 up to yields of approximately 1 joule with deuterium fuel, there has been an apparent plateau above that level. In experiments with FF-1, a mega-amp PF facility, we have found that going beyond this plateau requires elimination or extreme minimization of erosion of metals into the plasma sheath. Asymmetric erosion of electrode metals, common in such devices, has a large effect on the mass, velocity, viscosity and magnetization of the filaments, preventing symmetric compression of the dense plasmoid where fusion reactions take place. Such erosion tends to increase with higher currents, blocking higher yields. In addition, simulations have indicated that if the initiation points on the inner edge of the cathode are set too closely, filaments of current will collide chaotically, rather than emerging as isolated and identical structures, also impairing symmetrical compression. We have addressed these various obstacles in a set of experiments and report on results.

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