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Evidence for Critical Energy for Ion Confinement in Magnetic Fusion Reactors BOGDAN MAGLICH, TIM HESTER, DAN SCOTT, California Science & Engineering Corporation (CALSEC), CALSEC COLLABORATION — It is shown here that fusion test reactors could not ignite for half-a-century because trials were conducted at thermonuclear ion energies 10-30 KeV, an order of magnitude lower than *critical energy* [1-2], $E_c \sim 200$ KeV. At subcritical energies, plasma is destroyed by neutralization of ions via overlooked atomic (non-nuclear) charge transfer collisions with giant cross-section, 10^9 barns, 100 times greater than that for *ionization* collisions that counters neutralization. Neutral injection sets limit on ion magnetic confinement time $<10^{-6}$ s vs. >1 s required for ignition. In contrast, at energies *above* E_c, ionization prevails; near $\sim$ 1 MeV, stable confinement of 20 s was routinely observed [3] with *charged* injection. - To render ITER viable, ion energy must be increased to >/= 1 MeV; neutral radioactive DT fuel replaced with charged, nonradioactive deuterium, giving rise to compact *aneutronic* reactor with direct conversion into RF power [4].

[1] Physics Scripta, **23**, 143 (1981);
[2] Bull. APS DPP96 Meet, Denver, 1996, http://flux.aps.org/meetings/YR9596/BAPSDPP96/abs/G280014.html available on http://www.aneutronicfusion.org/;
[3] Phys. Rev. Lett. **54**, 769 (1985);
[4] ANEUTRONIC ENERGY, NIM A **271**, 209 (1988); Inst. Advanced Study Princeton, Symposium Coll. Beam Fusion.

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