Abstract Submitted
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Runaway electrons and ITER[1] ALLEN BOOZER, Columbia University — ITER planning for avoiding runaway damage depends on magnetic surface breakup in fast relaxations. These arise in thermal quenches and in the spreading of impurities from massive gas injection or shattered pellets. Surface breakup would prevent a runaway to relativistic energies were it not for non-intercepting flux tubes, which contain magnetic field lines that do not intercept the walls. Such tubes persist near the magnetic axis and in the cores of islands but must dissipate before any confining surfaces re-form. Otherwise, a highly dangerous situation arises. Electrons that were trapped and accelerated in these flux tubes can fill a large volume of stochastic field lines and serve as a seed for the transfer of the full plasma current to runaways. If the outer confining surfaces are punctured, as by a drift into the wall, then the full runaway inventory will be lost in a short pulse along a narrow flux tube. Although not part of ITER planning, currents induced in the walls by the fast magnetic relaxation could be used to passively prevent outer surfaces reforming. If magnetic surface breakup can be avoided during impurity injection, the plasma current could be terminated in tens of milliseconds by plasma cooling with no danger of runaway.

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