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Tridimensional Thermonuclear Instability in Subignited Plasmas and on the Surface of the Pulsars* A. CARDINALI, ENEA, Frascati, Italy, B. COPPI, MIT — Tridimensional modes involving an increase of the electron temperature can be excited as a result of α-particle heating in subignited D-T fusion burning plasmas when a nearly time- independent external source of heating is applied. The analyzed modes [1] are shown to emerge from an axisymmetric toroidal configurations and are radially localized around rational magnetic surfaces corresponding to $q(r = r_0) = m^0/n^0$ where m^0 and n^0 are the relevant poloidal and toroidal mode numbers. The radial width of the mode is of the order of the thermal scale distances $\delta_T = \left(D^{th}_{\perp e}/D^{th}_{\|e}\right)^{1/4} \left(R_0/n^0\right)^{1/2} \left(d\ln q/dr\right)_0^{-1/2}$. The mode has a rather severe damping rate, that has to be overcome by the relevant heating rate. Thus the temperature range to be considered is that where the D-T plasma reactivity undergoes a relatively large increase as a function of temperature. This kind of theory has been applied to the plasmas that are envisioned to be associated with surface of pulsar and be subjects to (spatially) inhomogenous thermonuclear burning. *Sponsored in part by the US DOE. [1] B. Coppi, et al. Nucl. Fus., 55, 053011 (2015).

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