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Simulation of fully global electromagnetic turbulence in the stellarator W7-X

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Magnetic confinement fusion requires high ⍰ = ⟨⍰⟩/(⍰
2/2⍰0), the ratio of plasma pressure to
magnetic pressure, to access high performances. Moderate ⍰ can be beneficial for iontemperature-gradient (ITG) driven turbulence. However, as ⍰ is increased above a certain
threshold, the so-called kinetic-ballooning-mode (KBM) [1] can be destabilized. This is a
plasma pressure gradient driven instability, which is inherently electromagnetic and can lead to
strong outwards-directed heat fluxes [2], degrading plasma confinement in the process. While,
linearly, KBMs have been successfully studied in the stellarator Wendelstein 7-X with fluxtube simulations [3, 4], it was also shown that the instability tends to be most unstable while
developing a global structure on the magnetic surface. This poster presents results of global
linear simulations of KBMs in W7-X geometry using the global gyrokinetic code Euterpe [5].

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