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Robustness of the filamentation instability in arbitrarily oriented magnetic field ANTOINE BRET, Universidad Castilla La Mancha — The filamentation (Weibel) instability plays a key role in the formation of collisionless shocks which are thought to produce Gamma-Ray-Bursts and High-Energy-Cosmic-Rays in astrophysical environments. While it has been known for long that a flow-aligned magnetic field can completely quench the instability, it was recently proved in 2D that in the cold regime, such cancelation is possible if and only if the field is perfectly aligned. Here, this result is finally extended to a 3D geometry. Calculations are conducted for symmetric and asymmetric counter-streaming relativistic plasma shells. 2D results are retrieved in 3D: the instability can never be completely canceled for an oblique magnetic field. In addition, the maximum growth-rate is always larger for wave vectors lying in the plan defined by the flow and the oblique field. On the one hand, this bears consequences on the orientation of the generated filaments. On the other hand, it certifies 2D simulations of the problem can be performed without missing the most unstable filamentation modes [1].

[1] Bret, PHYSICS OF PLASMAS 21, 022106 (2014)

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