Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

**Untangling resistive and collisionless electron filamentation instabilities in dense plasmas over large spatiotemporal scales** C. RICONDA, LULI, C. RUYER, CEA/DAM, S. BOLANOS, B. ALBERTAZZI, LULI, S. CHEN , ELI/RO, P. ANTICI, INRS, J. BOEKER, U. Duesseldorf, V. DERVIEUX, CEA/DAM, L. LANCIA, LULI, M. NAKATSUTSUMI, XFEL, L. ROMAGNANI, LULI, R. SHEPARD, LLNL, M. SWANTUSCH, U. Duesseldorf, M. BORGHESI, QUB , O. WILLI, U. Duesseldorf, H. PEPIN, INRS, M. STARODUBTSEV, IAP Nizhny Novgorod, MICKAEL GRECH, LULI, L. GREMILLET , CEA/DAM, J. FUCHS , LULI — Plasma micro-instabilities induced by high-energy particle currents play an important role in many space or laboratory plasma environments. Here, we report on measurements that reveal, over large temporal (tens of picoseconds) and spatial (hundreds of microns) scales, the growth of a multiplicity of electromagnetic filaments, following localized laser-generation of MeV electrons in a solid foil. The proton radiography data obtained in both low- and high-resistivity targets show two distinct, superimposed electromagnetic field patterns, which point to different field generation processes, namely of collisionless and resistive character. The collisionless Weibel instability is suggested, by particle-in-cell simulations, to build up in the dilute plasma expanding into the vacuum, independently of the target material, and to lead to observed azimuthally symmetric electromagnetic structures. Additionally, when the target resistivity is high enough, an additional resistive filamentation instability arises through the bulk target, resulting in observed radially elongated filaments.

Caterina Riconda
LULI

Date submitted: 02 Jul 2019 Electronic form version 1.4