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Scaling laws for radiative and magnetic fluids: pillar of laboratory astrophysics EMERIC FALIZE, CEA-LUTH — In this work, we consider the fundamental problem of scaling laws in RMHD. The emergence of powerful facilities (Laser, Pinch devices and Spheromack) allows the study of dynamical evolution of plasmas with radiation and magnetic field. This kind of plasmas is very usual in astrophysical environments and it is very interesting for Astrophysicists to obtain similar plasma in laboratory. We explore regimes [o(v/c) and o(v^2/c^2) approximation] with an approach based on Lie groups which leads to a rigorous and systematic method to get scaling laws. We focus on the number of free parameters (in the different regimes) available to determine all the physical quantities related to the target and to the laser, but also on the astrophysical objects that can potentially reproduced in laboratory with nowadays (LULI2000, Omega, GekkoXII, LIL) and future (LMJ, NIF) laser facilities.

Emeric Falize
CEA-LUTH

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