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Modeling Nonlinear Non-Stationary Self-Organized Asymptotic States in High Energy Density Plasmas Driven by Intense Crossing Laser Beams[1] BEDROS AFEYAN, Polymath Research Inc., Pleasanton, CA — The multiscale dynamics of Vlasov-Maxwell and Vlasov-Poisson systems where non-stationary self-organized states can be formed is a grand challenge. From chaotic particle orbits there arise collective self-consistent fields which are highly coherent. We will explain the novel aspects of these states and contrast them with electron plasma waves which are small amplitude disturbances that are naturally resonant. We will also point out connections between these systems and the high Reynolds number limit of 2D incompressible (Euler) turbulence, galaxy formation models and applications in the nonlinear optics of laser-matter interactions. Techniques will be given of capturing the multiscale dynamics and the conformal invariance hypothesis in the fine scale structures beneath the large scale order found in such systems.

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