Impact of Classical and Quantum Radiation Reaction on Collective Plasma Dynamics

L Silva[1] and P Bilbao[1]

[1] *GoLP/IPFN, Instituto Superior Tecnico, Universidade de Lisboa, Lisbon, Portugal*
Contact Email: luis.silva@tecnico.ulisboa.pt

One of the most exciting frontiers on the interaction of ultra high intensity electromagnetic fields with matter is the possibility for the processes underpinning these interactions to impact the collective dynamics of the system. I will illustrate a surprising yet apparently unexplored consequence of radiation reaction on the plasma kinetics at ultra high fields. Due to the nonlinear nature of radiation reaction, we have recently demonstrated [1] that synchrotron cooled plasmas will evolve to unstable distribution functions that can then radiate (at much lower frequencies). Our analytical results are illustrated with large scale numerical simulations in the classical and in the quantum regime.

References

[1] P Bilbao and L O Silva, Phys. Rev. Lett. **130**, 165101 (2023)