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Presentation 08: Particle Drifts and Radiation Reaction in Astrophysics

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Under the presence of strong electromagnetic fields, the electromagnetic radiation emmited by an accelerated charged particle will have a significant impact on its own trajectory. In these cases, it becomes crucial to include a radiation reaction force into the equations of motion to accurately describe the dynamics of charged particles.

In this work, we study how radiation reaction will alter the motion of individual charges, specifically focusing on how the different particle drifts are affected by this mechanism. We derive estimations for the modified particle drifts and compare them with numerical simulations.

Finally, we investigate how radiation reaction will affect the distribution function of a relativistic plasma. As the plasma particles cool down from radiation reaction, the plasma will develop a kinetically unstable momentum distribution that has the conditions necessary for coherent radiation. We focus on studying whether this property is generalized for more complex astrophysical configurations, where we expect particle drifts to play an important role.

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