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Nota di contenuto	Introduction -- Classical Electrodynamics -- Quantum Electrodynamics -- Kinetic Description -- Effect of RR on the Electron Distribution Function -- Domain of Validity of the Different Descriptions & Numerical Simulations -- Photon Distribution Function -- Two Counter-Propagating Plane-Waves -- Orbital Angular Momentum of Light : A State Of The Art -- Soft Pair Showers in the Collision of Gamma Rays with Laguerre-Gauss Beams -- Appendix.
Sommario/riassunto	This thesis presents several important aspects of the plasma dynamics in extremely high intensity electromagnetic fields when quantum electrodynamics effects have to be taken into account. This work is of utmost importance for the forthcoming generation of multipetawatt laser facilities where this physics will be tested. The first part consists of an introduction that extends from classical and quantum electrodynamics in strong fields to the kinetic description of plasmas in the interaction with such fields. This can be considered as an advanced tutorial which would be extremely useful to researchers and students new to the field. The second part describes original contributions on the analysis of the signatures of classical and quantum radiation reaction on the distribution function of the charged particles and of the photon spectrum, and leads to significant advances on this topic. These results are then extended to the analysis of the so-called QED cascades which are of central importance for a better understanding of some astrophysical phenomena and basic physics problems. Finally, the book

discusses future directions for the high intensity laser–plasma interaction community. The results presented in this thesis are expected to become more and more relevant as the new multipetawatt facilities become operative.

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