

Radiation reaction damping and ultra-intense gamma-ray flash generation in QED regime

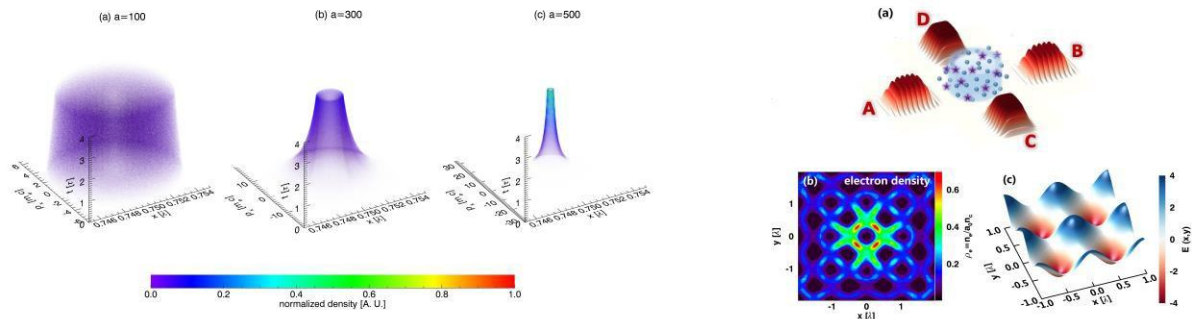
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An accelerated charged particle must be accompanied with radiation and corresponding radiation damping. The prospective tens petawatt-class short pulse laser may bring us into the radiation dominant regime [1] and quantum electrodynamics (QED) regime [2]. The entropy reduction and cooling in phase space are exhibited when radiation friction term being added to Lorentz equation. The electric nodes in circularly polarized counter-propagating laser field behave spiral attractive property and the ratio of electron accumulation nearby phase space can be obtained through eigen equation and eigenvalue [3]. However, when quantum parameter $\chi_e = F^{\text{Hv}} p_\perp / E_s m_e c$ approaches unity, the classical continuous radiation description cannot explain the discrete photon emission, pair plasma generation and quantum straggling effect. In multi strong pulse colliding configuration [4], the seeded electrons can be confined and accelerated efficiently to produce gamma-ray explosion and pair cascades, which provides potential application in laboratory astrophysics and e^+e^- collider.



References

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