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Non-radiating accelerating electrons

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Charged particles following curved paths are known to produce synchrotron radiation. This radiation causes a power loss that serves as a limiting factor when producing high energy particle collisions, particularly when the radius of curvature is small or the speed is close to c . Typically, one makes use of the electron in such high energy experiments and treats this as a classical particle. Here, we've made use of the wave nature of electrons in order to produce a structured electron wave field, and have demonstrated the creation of an angularly accelerating beam of electrons that produces no radiation. Additionally, we have made theoretical predictions on the electromagnetic field surrounding such a beam to understand why such a beam does not radiate.

Summary

By structuring the wave nature of charged particles, we've demonstrated the creation of an angularly accelerating electron Bessel beam that produces no radiation, which goes against the classical notion that a charged particle must radiate upon acceleration. Additionally, we make theoretical predictions on the electromagnetic field surrounding such a beam.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

Hons

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

No

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