Quantum Physics

Light scattering by an oscillating dipole in a focused beam

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(Submitted on 29 Jan 2009)

The interaction between a focused beam and a single classical oscillating dipole or a two-level system located at the focal spot is investigated. In particular, the ratio of the scattered to incident power is studied in terms of the oscillator's scattering cross section and the effective focal area. Debye diffraction integrals are applied to calculate it and results are reported for a directional dipolar wave. Multipole expansion of the incident beam is then considered and the equivalence between this and the Debye diffraction approach is discussed. Finally, the phase change of the electric field upon the interaction with a single oscillator is studied.

Comments:	9 pages, 6 figures
Subjects:	**Quantum Physics (quant-ph)**
Journal reference:	Nuovo Cimento C 31, 475 (2009)
DOI:	10.1393/ncc/i2009-10316-9
Cite as:	**arXiv:0901.4807v1 [quant-ph]**

Submission history

From: Mario Agio [view email]
[v1] Thu, 29 Jan 2009 23:36:14 GMT (444kb)

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