Quantum models for laser-matter interaction

Brigitte Bidégaray-Fesquet*
Brigitte.Bidegaray@imag.fr
WEB: http://ljk.imag.fr/membres/Brigitte.Bidegaray/

We address Maxwell-Bloch models for the description of the interaction of a classical laser wave with matter described at the quantum level. Such models can be derived for various materials such as gases or amorphous media, crystals, semi-conductor structures.... Although sharing some common features, these models have specific terms that need special care for the mathematical analysis and numerical approximations. They are often too precise to be used for simulations, but they include most phenomena that have to be added phenomenologically in perturbative models, and constitute an interesting basis to validate or study the limits of simpler models.

*Laboratoire Jean Kuntzmann (LJK), 51, rue des mathématiques, Grenoble Cedex 41, Isère 38360, FRANCE.