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Causal perturbation theory in quantum optics

Like other quantum field theories, the theory of atoms interacting with light requires renormalization to handle divergent terms. For relativistic field theories, Epstein and Glaser have proposed causal perturbation theory (CPT) as a method to avoid divergences before they occur. The key part of this method is to employ proper distribution splitting to define retarded and advanced propagators. In this talk, I will describe how CPT can be used to describe spontaneous emission of light by two-level atoms. [J. Math. Phys. 59, 042103 (2018)]