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Liouville-Space Descriptions for Intense-Field Coherent Electromagnetic Interactions[1] VERNE JACOBS, Naval Research Laboratory — Liouville-space (reduced-density-operator) descriptions are developed for coherent electromagnetic interactions of quantized electronic systems, taking into account environmental decoherence and relaxation phenomena. Applications of interest include many-electron atomic systems and semiconductor nanostructures. Time-domain (equation-of-motion) and frequency-domain (resolvent-operator) formulations are developed in a unified manner. In a preliminary semiclassical perturbative treatment of the electromagnetic interaction, compact Liouville-space operator expressions are derived for the linear and the general (nth order) non- linear electromagnetic-response tensors. Intense-field electromagnetic interactions are treated by an alternative reduced-density-operator approach based on the Liouville-space Floquet-Fourier representation.

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