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Computational approach to pair-creation processes¹ Q. SU, M. WARE, T. CHENG, R. GROBE, Intense Laser Physics Theory Unit, Illinois State University — We examine the spontaneous breakdown of the matter vacuum triggered by an external force of arbitrary strength and spatial and temporal variations. We derive a non-perturbative framework that permits for the first time the computation of the complete time evolution of various multiple electron-positron pair probabilities. These time-dependent probabilities can be computed from a generating function as well as from solutions to a set of rate-like equations with coupling constants determined by the single-particle solutions to the time-dependent Dirac equation. This approach might be of relevance to the planned experiments to observe for the first time the laser-induced breakdown process of the vacuum.

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