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Monte Carlo challenges for Non Perturbative QED

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Non perturbative QED is used to predict beam backgrounds at the interaction point of colliders, in calculations of Schwinger pair creation and in precision QED tests with ultra-intense lasers. In order to predict these phenomena, custom built monte carlo event generators based on a suitable non perturbative theory have to be developed. One such suitable theory uses the Furry Interaction Picture, in which a background field is taken into account non perturbatively at Lagrangian level. This theory is precise, but the transition probabilities are in general, complicated. This poses a challenge for the monte carlo which struggles to implement the theory computatively. The monte carlo must in addition taken into acount the behaviour of the background field at every space-time point at which an event is generated. We introduce here just such a monte carlo package, called IPstrong, and the techniques implemented to deal with the specific challenges outlined above.

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