

# Monte Carlo introduction

*Monday 9 December 2024 09:00 (1 hour)*

The role of the Monte-Carlo method in radiation calculations is discussed, highlighting its advantages and limitations. Probability distributions and sampling techniques are introduced, and the behavior of statistical uncertainty is characterized. The framework adopted for the simulation of particle transport and interactions is described, distinguishing between continuous and discrete processes. While the first ones are dealt with by a condensed history approach, the latter ones are treated according to a scheme coupling integral cross section evaluations, used to determine when a given type of interaction occurs, and physics models returning its final products. The relevance of users' choices in Monte-Carlo simulations is discussed, with specific reference to standard and custom cutoff values limiting the transport of low-energy particles. Typical scored quantities are critically reviewed. The concept of biased simulation is explained and its potential is highlighted, indicating different available options and reporting some illustrative examples.

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