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# GEANT4 simulations based results and studies in the CUPID-Mo and CUPID experiments

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The CUPID experiment is a next-generation bolometric 0νββ experiment that will be installed at LNGS in the CUORE cryostat. CUPID will search for the 0νββ of 100Mo with 1596 Li2MoO4 scintillating crystals. It will take advantage of the CUORE infrastructure and the recent development of scintillating crystals through the CUPID-0 and CUPID-Mo demonstrators. The CUPID-Mo demonstrator was located in the Laboratoire Souterrain de Modane (France) and studied the 0νββ of 100Mo with an array of 20 enriched Li2100MoO4 bolometers and 20 Ge light detectors. The experiment took
data from spring 2019 to summer 2020 and, at that time, set a leading limit on the half life of 0νββ decay of 100Mo (T1/2 > 1.8 x 1024 yr at 90% C.L.) with a total exposure of 2.71 kg.yr. In this talk, I will present the GEANT4 Monte-Carlo simulations that we developed with a detailed geometry of the set-up and the detector response that was applied. These Monte-Carlo simulations were used as input for the construction of a background model that was based on a global simultaneous fit of CUPID-Mo data using a Bayesian approach. This resulted in a measurement of the crystal contamination and demonstrated that CUPID-Mo achieved one of the lowest background index for a bolometric experiment. This also allowed us to measure with the best precision ever the 2νββ of 100Mo. In this talk, I will also present the GEANT4 simulations developed for the CUPID experiment and the projected backgrounds based on the knowledge from CUORE and CUPID-Mo experiments. In particular, I will also present a geometry-based biasing that we are currently implementing to simulate backgrounds that are CPU time-consuming, like the environmental background or contaminations in the radiation shields.

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