

# Employing Monte-Carlo codes for muon capture experiments

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This study employs the Monte Carlo code MCNP6 to simulate the behavior of a negative muon beam (4.2 MeV, 30,000  $\mu^-$ /s) as it interacts with the experimental setup of the OMC4DBD (Ordinary Muon Capture for Double Beta Decay) campaign, featuring a BaCO<sub>3</sub> target (95% Ba-136 enriched) and surrounding scintillators (C0-C3). The simulation tracks muons from the beam entrance, through attenuation in scintillators, to interactions at the target and beyond, including decay into electrons and secondary particle production. Results reveal a 34% reduction in muon beam intensity, attributed to 25% attenuation in scintillators and 9% decay into electrons, consistent with a muon lifetime of  $\sim 2.2 \mu\text{s}$  and material interactions.