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# Invariant mass reconstruction of the $\eta$ meson in the decay channel $\pi^+\pi^-\pi^0$ with the REDTOP experiment

## Abstract

REDTOP is a novel experiment being proposed at the Proton Booster of Fermilab with the intent of producing more than $10^{12}$ $\eta$ mesons per year in order to detect possible rare $\eta$ decays which can be a clear evidence of the existence of Physics Beyond the Standard Model. Such statistics are sufficient for investigating several discrete symmetry violations, new particles and interactions and precision studies. One of the golden processes to study is the $\eta$ -> $\pi^+\pi^-\pi^0$ decay, where $\pi^0$ decays rapidly into two photons.The dynamics of the charged pions is symmetric in this process, implying that any mirror-asymmetry in the Dalitz plot would be an irrefutable indication of C and CP violation. We present the expected performance of the REDTOP detector by reconstructing the invariant mass of the final state $\pi^+\pi^-\gamma\gamma$ using Monte Carlo samples.

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