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The REDTOP project: Rare Eta Decays with a TPC for Optical Photons

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The η meson is almost unique in the particle universe since it is a Goldstone boson and the dynamics of its decay are strongly constrained. Because the eta has no charge, decays that violate conservation laws can occur without interfering with a corresponding current. The integrated eta meson samples collected in earlier experiments have been less than $\sim 10^8$ events, limiting considerably the search for such rare decays. A new experiment, REDTOP, is being proposed at the proton booster of Fermilab with the intent of collecting more than 10^{12} triggers/year for studies of rare η decays. Such statistics are sufficient for investigating several symmetry violations, and for searches for new particles beyond the Standard Model. The physics program, the accelerator systems and the detector for REDTOP will be discussed during the colloquium.

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