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Non-accelerator physics with Hyper-Kamiokande (13' + 2')

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While the Standard Model provides an excellent description of low energy particle interactions, the description is nonetheless incomplete and there are well motivated reasons to believe it is only part of a larger theory.
Among these is its explicit conservation of baryon number, a quantity whose violation is required to produce the matter dominated universe observed today.
This issue is addressed in Grand Unified Theories, for instance, through the introduction of interactions which convert quarks into leptons and thereby allow for baryon number violation in the form of unstable nucleons.
Though the experimental signatures of nucleon decay are often tractable and several potential channels exist, a positive signal has never been observed.
Indeed, modern searches have yielded limits which begin to probe model predictions, constraining the lifetime to
less than 10^{33} or 10^{34} years depending on the decay mode.
Amid these stringent constraints the design of the next-generation water Cherenkov detector Hyper-Kamiokande is being optimized for observation of nucleon decay.
Not only is the detector planned to be an order of magnitude larger than predecessor experiments, but its improved photon yield will enable superior signal efficiency and background rejection.
As a result it is expected to have more than an order of magnitude better sensitivity to a signal.
This presentation will describe the physics potential of Hyper-Kamiokande's nucleon decay search program, including standard decay channels such as $p \to e^+\pi^0$ and $p \to \bar{\nu}K^+$ as well as several others.

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