

# Physics Colloquium

Tuesday, February 20<sup>th</sup> at 3:30 pm in SC 234

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## **The Matter – Anti-matter Asymmetry of the Universe and the Search for Neutrino-less Double Beta Decay**

Why is the universe composed only of matter, with negligible anti-matter? Is the neutrino its own anti-particle? These two seemingly disparate questions may be linked through *leptogenesis*—a theory which postulates massive neutrinos that break matter-antimatter asymmetry and could yield the universe we observe, inhabit and explore today. Leptogenesis forces today's neutrinos to be their own anti-particles with non-zero mass in the range of 50 meV, close to the measured value. The only practical avenue for determining the neutrino nature is the search for an almost unimaginably rare nuclear decay—neutrinoless double beta decay, possible in a few isotopes. I focus on NEXT, an experimental program based on  $^{136}\text{Xe}$ , in a high-pressure xenon gas Time Projection Chamber that combines excellent energy resolution and rejection of backgrounds through event topology. Strangely, a biochemistry technique might make success possible. Perhaps an exciting discovery awaits, one that may indicate how the universe chose to keep about one part per billion of matter.

Refreshments at 3:00 pm in SC 103