Tuesday, September 29, 2:30 pm

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Position: Research Scientist

Institution: TRIUMF

Title:
The search for an electric dipole moment in the neutron - why is it so difficult, and yet so impactful

Abstract: Observations show us that our Universe is matter dominated. Were they in equilibrium, it all had annihilated to light and energy and things would be quite boring.
Key to improving the understanding of this asymmetry between matter and antimatter are processes that involve CP-violation -- that is the violation of the combined symmetries of charge conjugation (C) and parity transformation (P). The Standard Model of Particle Physics fails to explain the observed ratio between matter and antimatter by several orders of magnitude due to a lack of CP-violating processes.
Thus, searches for those are very powerful beyond SM physics probes — like the search for a permanent electric dipole moment (EDM) of the free neutron. A non-zero neutron EDM violates P and time reversal (T) symmetry. T-violation is equivalent to the CP-violation, taking the CPT theorem for granted. This constitutes a strong link to the matter-antimatter asymmetry described above!
In this presentation I will introduce TRIUMF's ultracold neutron facility (the tool of choice to search for a neutron EDM) and lay out the strategy of our collaboration on how to successfully hunt this elusive quantity and improve the sensitivity of state of the art measurements by one order of magnitude.