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Ultracold neutron spin analysis - Counting uncharged particles and binning them according to their spin direction

Thursday, 28 May 2020 17:12 (18 minutes)

The TRIUMF Ultra-Cold Advanced Neutron (TUCAN) collaboration is currently developing a new ultra-cold neutron (UCN) source to supply the neutron electric dipole moment (nEDM) search experiment. Finding a nonzero nEDM, or improving its current upper limit, will shed light on the baryon asymmetry of the Universe (BAU) - given that any measurable nEDM violates CP-symmetry which is also a crucial ingredient of BAU. The TUCAN goal is to reach a sensitivity of $1 \times 10{-}27$ e·cm.
To successfully perform this measurement, UCN have to be counted according to their spin direction. Counting neutral particles like neutrons involves conversion processes, and analyzing their spin state relies on manipulation via oscillating magnetic fields and magnetized metal foils. This contribution will elaborate the technical details of neutron spin state analysis and their counting process.

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