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Statistical Biases in the UCNtau Experiment[1] CHEN-YU LIU, Indiana Univ - Bloomington, UCNTAU COLLABORATION — Statistical biases come to the fore as the UCNtau experiment pushes the uncertainty of neutron lifetime measurements toward 0.01% precision. In UCNtau, we store ultracold neutrons (UCN) in a lossless magneto-gravitational trap and count the surviving neutrons after various storage times. The reduction of the UCN population is described by the exponential radioactive decay law; the observed decay constant is the inverse of the neutron lifetime. The Poisson statistics of particle counting – due to its asymmetric distribution – leads to varying degrees of bias in the extracted lifetime, depending upon the treatment and combination of individual measurement cycles. I will explain how these biases manifest in the context of the multi-step neutron counting scheme used in UCNtau. These effects must be quantified to control the systematic shift that results from the phase-space evolution of neutrons stored in the trap.

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