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PENTrack - a versatile Monte Carlo tool for ultracold neutron sources and experiments RUEDIGER PICKER, TRIUMF, Vancouver, Canada, SANMEET CHAHAL, University of Ottawa, Canada, NICOLAS CHRISTOPHER, Universtity of Waterloo, Canada, MARTIN LOSEKAMM, Technische Universitaet Muenchen, Germany, JAMES MARCELLIN, Universtity of Brittish Columbia, Canada, STEPHAN PAUL, WOLFGANG SCHREYER, Technische Universitaet Muenchen, Germany, PRAMODH YAPA, University of Victoria, Canada — Ultracold neutrons have energies in the hundred nano eV region. They can be stored in traps for hundreds of seconds. This makes them the ideal tool to study the neutron itself. Measurements of neutron decay correlations, lifetime or electric dipole moment are ideally suited for ultracold neutrons, as well as experiments probing the neutron's gravitational levels in the earth's field. We have developed a Monte Carlo simulation tool that can serve to design and optimize these experiments, and possibly correct results: PENTrack is a C++ based simulation code that tracks neutrons, protons and electrons or atoms, as well as their spins, in gravitational and electromagnetic fields. In addition wall interactions of neutrons due to strong interaction are modeled with a Fermi-potential formalism and take surface roughness into account. The presentation will introduce the physics behind the simulation and provide examples of its application.

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