The basic scientific goal of this project is the construction of a spectrometer which will measure *in-situ* the energy spectrum of ultra-cold neutrons (UCN). UCN are the free neutrons with velocities lower than 7 m/s. They can be trapped by specially formed magnetic fields or in vacuum vessels coated with materials revealing high value of the Fermi potential. In this state UCN are excellent probes for studies of fundamental interactions. The basic principle of this innovative UCN velocity spectrometer makes use of the mechanical acceleration of an oscillating detector (with respect to UCN) such that at instant of collision with the detector active surface the critical (Fermi) velocity is surpassed. The frequency and the oscillation amplitude should be chosen such that the required velocity range (0 - 7 m/s) is covered.

A direct measurement of the energy spectrum of trapped UCN is still an unfulfilled dream of experimenters exploiting UCN in precission experiments carried out presently or planned. The UCN energy spectrum and its time evolution are often the key ingredients for estimation of systematic effects influencing the experimental uncertainty. The innovative method of the UCN velocity distribution measurement proposed in this project will be applied in one of the flagship experiments of Particle Physics on the low-energy front: the neutron Electric Dipole Moment (EDM) measurement carried out at the Paul Scherrer Institute, Villigen, Switzerland. This experiment aims at the ultimate accuracy of about $\sim 10^{-28}$ e·cm.