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UCN magnetic trapping and neutron lifetime measurements.

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Precision measurements of the neutron lifetime provide stringent tests of the standard electroweak model as well as crucial inputs for tests of Big-Bang nucleosynthesis. The present world average of the neutron lifetime is dominated by results obtained using material bottles for UCNs. This average does not include a recent measurement performed at ILL which produced a value that is 6.5 standard deviations away from the world average and 5.6 standard deviations from the previously most precise measurement. Since the two most precise results for the neutron lifetime were obtained using trapped UCN in material bottles, the large discrepancy between the values indicate that systematic effects are not fully under control. New alternative measuring techniques are then called for. A prototype of a magneto-gravitational trap has been successfully tested at ILL during last years and a value of the neutron lifetime has been obtained with a statistical precision of 1.8 s. The main features and advantages of experimental setup are discussed. A trap of larger volume is presently being designed to improve the statistical precision.

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