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## Using the Xe-129 co-magnetometer as a tool to improve the neutron electric dipole moment limit

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For more than half a century now, the neutron Electric Dipole Moment (nEDM) experiments have ruled out more CP-violation theories than any other violating type of experiments in history of physics. All the new generation nEDM experiments use a modified NMR technique and are aiming to reduce the current upper limit by one to two orders of magnitude by means -among others- of improving the statistical and systematic errors.

The Xe-129 optical co-magnetometer is expected to be a very useful tool to characterise accurately the magnetic field experienced by ultra-cold neutrons (UCN) while storage. The higher the Xe gas pressure the stronger the emitted optical signal which is used to measure the precession frequency of the polarised gas atoms. On the other hand, the presence of Xe-129 gas results in a lower neutron storage lifetime due to the finite capture cross section and leads to electrical breakdown and subsequently to a decreased high-voltage across the UCN storage cell. Both of these factors limit the sensitivity of the experiment.

In lack of experimental data, I am working on testing the high voltage (around 15 kV/cm) stability using Xe-129 alone and in mixture with other gases in the few mTorr region seeking to find the optimum conditions of gas pressure/composition and electrodes separation. The results of these tests are expected to be implemented on the nEDM experiment at KEK-RCNP/TRIUMF.

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