**NEUTRINOLESS DOUBLE-BETA DECAY WITH EXO: ACHIEVEMENTS AND PROSPECTS**

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In the search for the nature of the neutrino, neutrinoless double beta decay ($0\nu\beta\beta$) plays a significant role in understanding its properties. By measuring the $0\nu\beta\beta$ decay rate with the desired sensitivity, it is hoped to verify the nature of the neutrino (Majorana or Dirac particle), lepton number violation and help determine the values for the absolute neutrino masses. The Enriched Xenon Observatory (EXO), with its two phases; the current EXO-200 and the future multi-tonne upgrade nEXO, is aiming at search for the $0\nu\beta\beta$ decay of $^{136}Xe$. The EXO detector is a Time Projection Chamber (TPC) that uses liquefied Xenon (LXe) as source for the nuclear decay and as detection medium. EXO-200 detector is located at deep underground salt mine (~1585) m.w.e. at WIPP (Waste Isolation Pilot Plant) facility in New Mexico - USA.

The EXO-200 collaboration has reported $T_{1/2} = (2.165 \pm 0.016\text{stat} \pm 0.059\text{sys}) \times 10^{21}$ yr for the $2\nu\beta\beta$ decay and a lower limit $T_{1/2} > 1.1 \times 10^{25}$ yr (at 90% C.L.) for the $0\nu\beta\beta$ decay corresponding to effective Majorana masses less than 190-450 meV. The nEXO detector is aiming at raising the $0\nu\beta\beta$ half-life sensitivity to $> 10^{27}$ years (at 90% C.L.). This value is sufficient to achieve $\langle m_{\beta\beta} \rangle$ at the bottom of the inverted hierarchy, for a wider range of nuclear matrix elements.

Here, I will shed light on the EXO-200 results. As well as, on the current EXO R&D programs, that are running in order to improve the sensitivity of the next EXO phase (nEXO).