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R2D2: a xenon TPC for neutrinoless double beta decay search

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The search for neutrinoless double beta decay could cast light on one critical piece missing in our knowledge i.e. the nature of the neutrino mass. Its observation is indeed the most sensitive experimental way to prove that neutrino is a Majorana particle. The observation of such a potentially rare process demands a detector with an excellent energy resolution, an extremely low radioactivity, a capability to identify the 2 emitted electrons and a large mass of emitter isotope. Nowadays many techniques are pursued but none of them meets all the requirements at the same time. The goal of R2D2 is to prove that a cylindrical high pressure TPC filled with xenon gas could meet all the requirements and provide an « ideal » ton-scale detector for the 0νββ decay search. A new prototype has demonstrated an excellent resolution with argon at pressure up to 10 bars. New results with xenon up to 6 bars are very encouraging et confirm the potential of the detector. In the proposed talk the R2D2 results obtained with the last prototype will be discussed as well as the project roadmap and future developments.

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