

R2D2: a xenon TPC for neutrinoless double beta decay search

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The search for neutrinoless double beta decay as an experimental proof of the nature of the neutrino mass is currently a driving effort in neutrino physics. The deep connection with the possible Majorana nature and the mass origin of the neutrino make this observation one of the hottest topics in particle physics. The observation of such a potentially rare process requires a detector with an excellent energy resolution, extremely low background 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 spherical high pressure TPC filled with xenon gas could meet all the requirements and provide an ideal detector for the $0\nu\beta\beta$ decay search. Currently two prototypes, a spherical (SPC) and a cylindrical (CPC) one, are operated and tested at Bordeaux LP2I. SPC has demonstrated an energy resolution below 1.4% with argon at pressure up to 3 bar. The first results in xenon show a resolution under 1.4% at 1 bar in CPC. In the proposed poster the R2D2 results obtained with both SPC and CPC will be discussed as well as the project roadmap and future developments.

