

**Abstract**

The R2D2 experiment is an R&D project aiming to asses the opportunity to use a Spherical High-Pressure Gaseous TPC for neutrinoless double beta decay searches. To observe such a rare process (if it exists), an excellent energy resolution is required, as well as a very low radioactive background and a large mass of  $\beta\beta$  emitter isotope. The first prototype, hosted in CENBG (Bordeaux), focuses on demonstrating the capabilities in terms of energy resolution.

In this talk we will highlight the first results delivered by this demonstrator. Measures were taken with a  $^{210}\text{Po}$  alpha source in a gas mixture of ArgonP2 (98%Ar + 2%CH4) at both 200 and 1100mbars. They showed an energy resolution of 1.1% at 5.3MeV. Various analysis have led us to the conclusions that this resolution is robust to variation of track direction or length.

In addition we will discuss about the improved understanding of detector features, enabled by the work carried-out in this configuration, combined with simulation results.

The foreseen detector upgrades will be also presented.