

Measurement of gas properties for the ion-TPC of NvDEx experiment

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In the NvDEx collaboration, a high-pressure gas TPC is being developed to search for the neutrinoless double beta decay. The use of electronegative $^{82}\text{SeF}_6$ gas mandates an ion-TPC. The reconstruction of z coordinate is to be realized exploiting the feature of multiple species of charge carriers. As the initial stage of the development, we studied the properties of the SF_6 gas, which is non-toxic and has similar molecular structure to $^{82}\text{SeF}_6$. In this work we present the measurement of drift velocities and mobilities of the majority and minority negative charge carriers found in SF_6 at a pressure of 750 Torr, slightly higher than the local atmospheric pressure. The reduced fields range between 3.0 and 5.5 Td. It was performed using a laser beam to ionize the gas inside a small TPC, with a drift length of 3.7 cm. A customized charge sensitive amplifier was developed to read out the anode signals induced by the slowly drifting ions. The reconstruction of z coordinate using the difference in the velocities of the two carriers was also demonstrated.

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