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## Electron transport measurements in liquid xenon with Xenoscope, a large-scale DARWIN demonstrator

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There is a compelling physics case for a large, xenon-based underground detector devoted to dark matter and other rare-event searches. A two-phase time projection chamber as inner detector allows for a good energy resolution, a three-dimensional position determination of the interaction site and particle discrimination. To study challenges related to the construction and operation of a multi-tonne scale detector, we have designed and constructed a vertical, full-scale demonstrator for the DARWIN experiment at the University of Zurich. Here we present first results from a several-months run with 343 kg of xenon and electron drift lifetime and transport measurements with a 53 cm tall purity monitor immersed in the cryogenic liquid. After 88 days of continuous purification, the electron lifetime reached a value of 664(23) microseconds. We measured the drift velocity of electrons for electric fields in the range (25–75) V/cm, and found values consistent with previous measurements. We also calculated the longitudinal diffusion constant of the electron cloud in the same field range, and compared with previous data, as well as with predictions from an empirical model.

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