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Strax and Straxen: Streaming analysis for xenon experiments.

*(on behalf of the XENON collaboration)

Over the last decades noble liquid time projection chambers (TPCs) have become one of the forefront technologies for the search in WIMP dark matter. As the detector increases in size, so do the amount of data and data-rates, leading to higher demands on the analysis software.

The “streaming analysis for xenon experiments” (strax) is a software package developed by the XENON collaboration for the upcoming XENONnT experiment. It provides a framework for signal processing, data storage and reduction as well as corrections handling for noble liquid TPCs. The software is written in Python and relies heavily on the SciPy-stack. The data itself is organized in a tabular format utilizing a combination of numpy structured arrays and numba for high performances. This approach allows live online processing of the data with throughputs of 60 MB raw / sec / core. Strax is an open source project and is used by a couple of smaller liquid xenon TPCs such as XAMS and XEBRA. It is also test by the nEXO Experiment for their MC simulations.

In this talk we will explain the working principle and infrastructure provided by strax. We will show how a complex processing streamline can be build up via so called strax plugins based on XENON-collaborations open source package called straxen.

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