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The Vertical Slice Data Processing Scheme for DarkSide

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DarkSide-20k is a planned two-phase liquid Argon time-projection-chamber (LAr-TPC) for direct WIMP search. The S1 and S2 light from the 20 ton fiducial volume is detected with Silicon photomultipliers and digitized. Due to the expected data rate of hundreds of MB/s it is impractical to record full waveform data continuously like in the smaller DarkSide-50 experiment, instead complex filtering and processing is required to select meaningful data. Since this processing needs to take into account all (above threshold) data channels at once, it cannot happen directly in the acquisition module, but all data has to be transferred to a processing farm, where processing time will likely exceed acquisition time. In order to address this, data will be compiled into time slices (on the order of a second), which get distributed to individual processing machines. The process is somewhat complicated by the fact that due to the long drift time in the TPC signals from the same physical event can be spread out over milliseconds, it is thus necessary for time slices to overlap enough to ensure each physical event is contained completely in one slice.
This presentation will give an overview of the DarkSide vertical slice scheme and show how it is implemented within a MIDAS-based data acquisition system.

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