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A real-time clustering ASIC for the PXD in Belle II

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The grouping of data elements based on characteristic relations is known as clustering.
It can either be used for data compression in a DAQ chain, or even to calculate the characteristic trigger input values based on event data.
Driven by the requirements of the PXD detector in the Belle II experiment @KEK/Japan, a real-time clustering engine was developed.
This software-inspired hardware architecture is by a pipelined structure able to perform up to 50k times per second the full 2D clustering of the zero-suppressed data out of a detector array with 768x250 pixels with a up to 3% fill rate and only one frame latency.
Due to the scalable architecture of the clustering core, the engine can
be easily adapted to the specific needs of other target applications,
even to 3D or higher dimensional operation.
A first test chip in TSMC 65nm process technology is back from the production and goes now in initial tests.

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