

# Message Queues for Online Reconstruction on the Example of the PANDA Experiment

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One of the large challenges of future particle physics experiments is the trend to run without a first level hardware trigger. The typical data rates exceed easily hundreds of GBytes/s, which is way too much to be stored permanently for an offline analysis. Therefore a strong data reduction has to be done by selection only those data, which is physically interesting. This implies that all detector data is read out and has to be processed with the same rate as it is produced. Several different hardware approaches from FPGAs, GPUs to multicore CPUs and mixtures of these systems are under study. Common to all of them is the need to process the data in massive parallel systems.

One very convenient way to realize parallel systems on CPUs is the usage of message queue based multiprocessing. One package that allow development of such application is the FairMQ module in the FairRoot simulation framework developed at GSI. FairRoot is used by several different experiments at and outside the GSI including the PANDA experiment. FairMQ is an abstract layer for message queue base application, it has two implementations: ZeroMQ and NanoMSG. For the PANDA experiment, FairMQ is under test in two different ways. On one hand side to online process test beam data of prototypes of sub-detectors of PANDA and, in a more generalized way, on time-based simulated data of the complete detector system. In the presentation results from both tests will be shown.

## Primary Keyword (Mandatory)

Data processing workflows and frameworks/pipelines

## Secondary Keyword (Optional)

Reconstruction

## Tertiary Keyword (Optional)

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