

Workshop IX on Streaming Readout

Report of Contributions

Contribution ID: 2

Type: **not specified**

ALICE Online-Offline

Thursday, December 9, 2021 9:30 AM (25 minutes)

Presenter: ROHR, David (CERN)

Session Classification: Computing, Data Rates

Track Classification: Computing, Data Rates

Contribution ID: 3

Type: **not specified**

LHCb Data Processing and Allen

Thursday, December 9, 2021 9:00 AM (25 minutes)

Presenter: VOM BRUCH, Dorothea (CNRS Marseille)

Session Classification: Computing, Data Rates

Track Classification: Computing, Data Rates

Contribution ID: 4

Type: **not specified**

ECCE Computing Model

Thursday, December 9, 2021 10:30 AM (25 minutes)

Presenter: LAWRENCE, David (Jefferson Lab)

Session Classification: Computing, Data Rates

Track Classification: Computing, Data Rates

Contribution ID: 5

Type: **not specified**

Discussion Session

Thursday, December 9, 2021 12:00 PM (30 minutes)

Presenters: OSBORN, Joe (ORNL); DIEFENTHALER, Markus (Jefferson Lab)

Session Classification: Computing, Data Rates

Track Classification: Computing, Data Rates

Contribution ID: 6

Type: **not specified**

Exascale Role

Thursday, December 9, 2021 11:00 AM (25 minutes)

Presenter: GAINARU, Ana (Oak Ridge National Laboratory)

Session Classification: Computing, Data Rates

Track Classification: Computing, Data Rates

Contribution ID: 8

Type: **not specified**

CLAS12 Streaming Readout

Wednesday, December 8, 2021 2:00 PM (25 minutes)

Presenter: MORAN, Patrick (MIT)

Session Classification: Detector Status Updates 2

Track Classification: Detector Status Updates

Contribution ID: 9

Type: **not specified**

Streaming Mode Data Acquisition and Data Processing at the Jefferson Lab

Wednesday, December 8, 2021 2:30 PM (25 minutes)

Presenter: GYURJYAN, Vardan

Session Classification: Detector Status Updates 2

Track Classification: Detector Status Updates

Contribution ID: **10**

Type: **not specified**

Welcome

Wednesday, December 8, 2021 9:00 AM (15 minutes)

Presenter: Dr SCHAMBACH, Joachim (Oak Ridge National Laboratory)

Session Classification: Detector Status Updates 1

Track Classification: Detector Status Updates

Contribution ID: 11

Type: **not specified**

ALICE Streaming Readout

Wednesday, December 8, 2021 9:15 AM (25 minutes)

Presenter: COSTA, Filippo (CERN)

Session Classification: Detector Status Updates 1

Track Classification: Detector Status Updates

Contribution ID: 12

Type: **not specified**

LHCb: Trigger-less Readout at 40 MHz

Wednesday, December 8, 2021 9:45 AM (25 minutes)

Presenters: FKIARAS, Aristeidis (CERN); NEUFELD, Niko (CERN)

Session Classification: Detector Status Updates 1

Track Classification: Detector Status Updates

Contribution ID: 13

Type: **not specified**

Simple and Scalable Streaming: The GRETA Data Pipeline

Wednesday, December 8, 2021 3:30 PM (25 minutes)

Presenter: CROMAZ, Mario (LBNL)

Session Classification: Detector Status Updates 2

Track Classification: Detector Status Updates

Contribution ID: 14

Type: **not specified**

sPHENIX Streaming Readout

Wednesday, December 8, 2021 4:00 PM (25 minutes)

Presenter: PURSCHKE, Martin (BNL)

Session Classification: Detector Status Updates 2

Track Classification: Detector Status Updates

Contribution ID: 15

Type: **not specified**

Discussion on Detector Updates

Wednesday, December 8, 2021 4:30 PM (30 minutes)

Presenter: Dr HASELL, Douglas (MIT)

Session Classification: Detector Status Updates 2

Track Classification: Detector Status Updates

Contribution ID: 16

Type: **not specified**

ATHENA Computing Model

Thursday, December 9, 2021 10:00 AM (25 minutes)

Presenter: LANDGRAF, Jeff (Brookhaven National Laboratory)

Session Classification: Computing, Data Rates

Track Classification: Computing, Data Rates

Contribution ID: 17

Type: **not specified**

Machine Learning for HF identification in sPHENIX and EIC Streaming Readout

Friday, December 10, 2021 11:45 AM (30 minutes)

Presenter: DEAN, Cameron (Los Alamos National Laboratory)

Session Classification: DAQ, Future & Test Plans

Track Classification: DAQ, Future & Test Plans

Contribution ID: **18**

Type: **not specified**

Real-time Machine Learning at BNL CSI

Friday, December 10, 2021 2:00 PM (25 minutes)

Presenter: REN, Yihui (Brookhaven National Laboratory)

Session Classification: DAQ, Future & Test Plans

Track Classification: DAQ, Future & Test Plans

Contribution ID: **19**

Type: **not specified**

INTERSECT

Friday, December 10, 2021 1:30 PM (25 minutes)

Presenter: MINTZ, Ben (ORNL)

Session Classification: DAQ, Future & Test Plans

Track Classification: DAQ, Future & Test Plans

Contribution ID: 20

Type: **not specified**

Discussion: challenges and opportunities in high noise/background mitigation

Friday, December 10, 2021 2:30 PM (30 minutes)

Presenters: BERNAUER, Jan (Stony Brook University); HUANG, Jin (Brookhaven National Lab)

Session Classification: DAQ, Future & Test Plans

Track Classification: DAQ, Future & Test Plans

Contribution ID: 22

Type: **not specified**

AI Resources for EIC

Thursday, December 9, 2021 11:30 AM (25 minutes)

Presenter: RANKIN, Dylan (MIT)

Session Classification: Computing, Data Rates

Track Classification: Computing, Data Rates

Contribution ID: 25

Type: **not specified**

A novel continuous readout for the NA62 data acquisition system

Wednesday, December 8, 2021 11:00 AM (25 minutes)

Presenter: BORETTO, Marco (CERN)

Session Classification: Detector Status Updates 1

Track Classification: Detector Status Updates

Contribution ID: 27

Type: **not specified**

32-Channel ASICS for SRO

Thursday, December 9, 2021 3:30 PM (25 minutes)

Presenter: Dr BARANAUSKAS, Dalius (Pacific Microchip Corp)

Session Classification: Hardware Vendors

Track Classification: Hardware Vendors

Contribution ID: 28

Type: **not specified**

Nalu HDSoc Update

Thursday, December 9, 2021 4:30 PM (25 minutes)

Presenter: Dr MOSTAFANEZHAD, Isar (Nalu Scientific, LLC)

Session Classification: Hardware Vendors

Track Classification: Hardware Vendors

Contribution ID: 29

Type: **not specified**

Future Perspectives of Digital DAQ

Thursday, December 9, 2021 2:00 PM (25 minutes)

Presenter: Dr VENTURINI, Yuri (CAEN)

Session Classification: Hardware Vendors

Track Classification: Hardware Vendors

Contribution ID: 30

Type: **not specified**

Scalable Online Processing for Trigger-less DAQ

Friday, December 10, 2021 10:00 AM (25 minutes)

Presenter: PAZZINI, Jacopo

Session Classification: DAQ, Future & Test Plans

Track Classification: DAQ, Future & Test Plans

Contribution ID: 31

Type: **not specified**

The readout system of the DUNE experiment

Wednesday, December 8, 2021 10:15 AM (25 minutes)

The Deep Underground Neutrino Experiment (DUNE) is a neutrino experiment under construction with a near detector at Fermilab and a far detector at the Sanford Underground Research Facility that will observe neutrinos produced at Fermilab. The far detector electronics are streaming out a constant rate of ADC data at 2 MHz. As the signals can be very small, no zero suppression is applied. The new technical design of the DAQ system for the experiment has major differences compared to its prototypes. Its interfaces with the front-end electronics rely on high-speed I/O cards that are hosted in commodity servers. Data is received over DMA to memory buffers dedicated to the devices, from where it is serialized and moved to a parallel processing pipeline that implements data driven algorithms like hit-finding or calibration and error handling. After that, data is stored in high-performance software buffers. The parallelized request-response domain answers to data requests, based on unique identifiers (e.g.: timestamp) in the front-end frames. The latency buffer lookup mechanism copies out the requested data and forms responses with additional metadata. This experiment must also be capable of persisting, upon a specific request, incoming data for up to 100 seconds, with a throughput of 1.5 TB/s, for an aggregate size of 150 TB. The modular nature of the apparatus enables splitting the problem into 150 identical units operating in parallel, each at 10 GB/s. These numbers correspond to one detector super module. Two are planned for initial construction and four is the final configuration of the experiment. In order to maintain the performance requirements of such a system, a generic, modular and scalable readout system was designed and developed.

Primary author: SIPOS, Roland (CERN)

Presenter: SIPOS, Roland (CERN)

Session Classification: Detector Status Updates 1

Track Classification: Detector Status Updates

Contribution ID: 32

Type: **not specified**

TriDAS SRO Framework

Friday, December 10, 2021 9:30 AM (25 minutes)

Trigger and Data Acquisition System, or TriDAS for short, is a triggerless streaming readout software developed initially for the NEMO neutrino telescope project. Since then, thanks to its scalability and modularity, the system has been adapted to collect data from different phases of the project and also from other detectors. In summer 2020, TriDAS was used to implement a prototype streaming readout data-taking with the CLAS12 detector, at JLAB. These days, a new TriDAS version is under development for the integration in the ERSAP microservices architecture. This implementation sketches preliminary studies toward the streaming readout for the EIC project.

Primary authors: Ms CAPPELLI, Laura (INFN - CNAF); PELLEGRINO, Carmelo (INFN-CNAF); CHIARUSI, Tommaso (INFN-Bologna); GIACOMINI, Francesco (INFN-CNAF)

Presenter: Ms CAPPELLI, Laura (INFN - CNAF)

Session Classification: DAQ, Future & Test Plans

Track Classification: DAQ, Future & Test Plans

Contribution ID: 33

Type: **not specified**

The readout system of the CBM experiment

Wednesday, December 8, 2021 1:30 PM (25 minutes)

Presenter: Dr EMSCHERMANN, David (GSI)

Session Classification: Detector Status Updates 2

Track Classification: Detector Status Updates

Contribution ID: 34

Type: **not specified**

Free-running data acquisition system for the AMBER experiment

Wednesday, December 8, 2021 11:30 AM (25 minutes)

Triggered data acquisition systems provide only limited possibilities of triggering methods. In our paper, we propose a novel approach that completely removes the hardware trigger and its logic. It introduces an innovative free-running mode instead, which provides unprecedented possibilities to physics experiments. We would like to present such system, which is being developed for the AMBER experiment at CERN. It is based on an intelligent data acquisition framework including FPGA modules and advanced software processing. The system provides a triggerless mode that allows more time for data filtering and implementation of more complex algorithms. Moreover, it utilises a custom data protocol optimized for needs of the free-running system. The filtering procedure takes place in a server farm playing the role of the highlevel trigger. For this purpose, we introduce a high-performance filtering framework providing optimized algorithms and load balancing to cope with excessive data rates. Furthermore, this paper also describes the filter pipeline as well as the simulation chain that is being used for production of artificial data, for testing, and validation.

Primary author: Mr ZEMKO, Martin (CERN)

Presenter: Mr ZEMKO, Martin (CERN)

Session Classification: Detector Status Updates 1

Track Classification: Detector Status Updates

Contribution ID: 35

Type: **not specified**

EJFAT - A Joint ESnet / JLAB prototype load balancer for large scale DAQ processing

Friday, December 10, 2021 10:30 AM (25 minutes)

Jlab and ESnet jointly identified a need for terabit scale data processing of DAQ data from new large scale accelerator facilities. Most DOE instruments are evolving to provide 100's of gigabits to many terabits of raw data, which needs to be processed in hundreds of hardware accelerated DSP equipped servers for event extraction and data set recording. In this talk we describe the implications on IP based protocols used to transport this data, as well as a trigger and event aware load balancer that can sort data with nanosecond trigger granularity and direct it to a flexible cloud of processing elements. The load balancer can be implemented in hardware with a combination of FPGAs and terabit data center top of rack switches.

Primary author: KUMAR, Yatish (ESNET)

Presenter: KUMAR, Yatish (ESNET)

Session Classification: DAQ, Future & Test Plans

Track Classification: DAQ, Future & Test Plans

Contribution ID: 36

Type: **not specified**

Development of FELIX for DAQ System for Nuclear and Particle Physics experiments

Friday, December 10, 2021 11:15 AM (25 minutes)

Presenter: XU, Hao (Brookhaven National Laboratory)

Session Classification: DAQ, Future & Test Plans

Contribution ID: 37

Type: **not specified**

A new front-end ASIC for MPGDs at EIC

Thursday, December 9, 2021 2:30 PM (25 minutes)

Presenter: Dr NEYRET, Damien (CEA)

Session Classification: Hardware Vendors

Contribution ID: **38**

Type: **not specified**

CAEN QDC and Digitizers from the 2019 test beam period

Thursday, December 9, 2021 3:00 PM (25 minutes)

Presenter: FRIŠČIĆ, Ivica (Department of Physics, PMF, University of Zagreb)

Session Classification: Hardware Vendors

Contribution ID: 39

Type: **not specified**

Alphacore's Mixed-Signal IC Update

Thursday, December 9, 2021 4:00 PM (25 minutes)

Presenter: Dr MIKKOLA, Esko (Alphacore)

Session Classification: Hardware Vendors

Contribution ID: 40

Type: **not specified**

Closeout

Friday, December 10, 2021 3:00 PM (5 minutes)

Presenter: OSBORN, Joe (ORNL)

Session Classification: DAQ, Future & Test Plans