# DAQFEET-2021

Monday, February 8, 2021 - Wednesday, February 10, 2021

ZOOM

# Book of Abstracts

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**Main session** / **1**

## ARCADIA: Fully Depleted CMOS MAPS technology

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ARCADIA is an INFN R&D Platform for the design, fabrication and system integration of fully-depleted CMOS monolithic sensors and associated electronics, firmware and software.
The Collaboration developed a novel sensor technology allowing for:
- Active sensor thickness in the range 50 µm to 500 µm or more;
- Operation in full depletion with fast charge collection only by drift;
- Small charge collecting electrode for optimal signal-to-noise ratio;
- Scalable readout architecture with ultra-low power capability;
- Compatibility with standard CMOS fabrication processes.
We will present the ongoing activities and future perspectives towards the use of the ARCADIA CMOS DMAPS technology on future HEP infrastructures.

**Main session** / **2**

## Welcome talk from AMBER representative

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## Evolution of COMPASS++/AMBER Spectrometer towards RF Separated Beam

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## Drell-Yann Detector Upgrade and Data Rates

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## DAQ Project

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**Main session** / **6**

## SciFi for PRM Detector

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## Pixel detectors

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## LHCb DAQ

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**Main session** / **9**

## Sensor development for the ALICE ITS upgrade in LS3

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**Main session** / **10**

## VMM3

**Corresponding Author:** michael.lupberger@cern.ch

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## Modern trends in programming for GPUs

We will present modern GPU architectures and their advantages compared to CPUs. We will also discuss modern trends in GPU programming which should make this very powerful architecture easily available even to scientists who do not have deep knowledge about the design of GPUs.

**Main session** / **12**

## TPC readout

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## FriDAQ Hardware Development

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## Analysis software 1

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## Analysis software 2

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## FZU Computing Center

Computing Center operated at Institute of Physics of the Czech Academy of Sciences hosts WLCG Tier-2 center, cluster LUNA connected to the Czech national grid infrastructure Metacentrum and cluster Koios for local users. External computing and storage capacities are transparently connected. I will give an overview of the available hardware, management, and operational procedures and compare usage patterns of different scientific groups.

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## Time Slice Builder

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## Student's projects

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## Software developments

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## Discussion about the FriDAQ Software Framework

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A short Introduction into the FriDAQ Software Framework - what do we have - what do we need

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## Status of the FriDAQ infrastructure

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An overview about the general status of the DAQ installation for 2021 and beyond.

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## Introduction to the FriDAQ Protocol

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## FriDAQ data generator framework

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## FriDAQ HLT Framework

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## Spill Buffer for FriDAQ

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## ALPIDE Detector

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## GEM Readout

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## New Electronics for ECAL2

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## ECAL2 Signal Processing

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## Data Compression

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## 32 Tb/s DAQ for the LHCb experiment at CERN

**Author:** Rafal Dominik Krawczyk[1]

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The currently-commissioned LHCb data acquisition system for Run3 will collect data in runtime at 32 Tbit/s. The new version of the customized cluster will implement a fully software-defined selection of uncompressed FPGA streams. The principle of LHCb's operation enforces all-to-all lossless communication to assemble scattered data for further real-time selection. The cost-optimized architecture consists of the network and the servers that operate at close-to-the-link and close-to-the-memory-throughput capacity. The aim is to ultimately output into storage heavily compressed events at a much-reduced throughput of 1 Gigabit per second. This talk presents the most important development and commissioning decisions and lessons learned along the road. Topics of front-end FPGAs, tested networks, evaluation-based choice of hardware, and commissioning are covered.

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## ARCADIA Detector

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## Use of the GPUs in radio astronomy

Abstract: GPUs are widely used in many areas of science, scientific computing and real-time data processing. In this talk, I will briefly introduce some of GPUs' uses in the (near) real-time data processing in radio astronomy for the Square Kilometre Array (SKA) radio telescope. The Square Kilometre Array (SKA) is an international initiative for developing the world's largest radio telescope with a total collecting area of over a million square meters. The data processing in radio astronomy is for the most part low in arithmetical intensity which necessitated good data reuse in the GPU implementations, and it has to deal with an unknown of inputs or number of samples on vastly different scales. A particular example of this is when an image is reconstructed from frequency-domain data (gridding) and when an image is transformed back to frequency domain (de-gridding) in the iterative image cleaning process.

**Main session** / **34**

## TPC for Pilot Run Staus

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**Main session** / **35**

## PRM SciFi Detector Status

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## FriDAQ Tests

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## Infrastructure

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**DAQ Software** / **38**

## FriDAQ software plans for 2021

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**DAQ Software** / **39**

## Computing for AMBER

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## Objectives of PRM Pilot Run

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## Neural network analysis of CEDAR data

As 2018 data taking used a much higher beam intensity than before, current data analysis of CEDAR detectors output is not applicable. A new method for beam particle identification shall be developed using artificial neural networks

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## Monitoring tools for future

The planned transition to the new FriDAQ data format requires significant modifications of the current DAQ software. Highly affected parts include monitoring tools COOOL and MurphyTV, and related DaqDataDecoding library. In the presentation, a student project aiming to facilitate the adjustment of the mentioned programs is introduced. The talk contains a summary of the initial state, a discussion of the scale of necessary changes, and an outline of further work

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## User friendly configuration tools

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## FriDAQ Hardware Development

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## VMM3 - Progress in the development

**Author:** Michael Lupberger[1]

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This presentation will outline the latest developments and findings with VMM3a. It reports on several activities carried out within the RD51 collaboration using the general Scalable Readout System. After the ASIC has been integrated within the last years, the first commercial production of joint orders by many teams was just completed. In several projects, the system was improved, a QA system was developed and properties of the chip like noise, time and energy resolution were studied.

**Frond-End** / **46**

## Electronics for GEM Detectors - Recent Developments

**Authors:** Christian Honisch[1]; Karl Flöthner[2]; Candas Tezel[1]; Michael Lupberger[1]; Bernhard Ketzer[1]

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Multi-GEM detectors are widely used for the tracking of charged particles with good spatial resolution at high luminosity, while using only a very low material budget. For the COMPASS experiment at CERN, the third generation of these detectors is currently being constructed, while and the fourth generation is under development.

This talk presents the most recent improvements on the readout and auxiliary electronics for these detectors. A new stabilized high-voltage divider offers both a more stable operation under varying detector currents and an improved protection in case of short circuits in GEM foils. A new revision of APV frontend cards is currently being produced. The new revision includes specialized ESD protection diodes which have a lower parasitic capacitance while offering a better protection against discharges.
The protection circuit was tested with a custom-built discharge simulator which is able to deliver surges with well reproducible characteristics.

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## GUI for Configuration of COMPASS DAQ

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Meeting functional requirements does not ensure a good user experience and ease of operating a software product. Therefore, every developer should try to build a user-friendly application. The presentation covers the topic of how to make a configuration tool for COMPASS DAQ intuitive and self-descriptive, even for non-experienced users.

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## Welcome Address by AMBER

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## ALPIDE in Pilot Run

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