Student's Zone 2019 of the NICA Project

Saturday, 1 June 2019 - Monday, 30 September 2019

JINR DUBNA

Book of Abstracts

Contents

Presentations of topics / **1**

Feasibility studies of baryon correlations in the MPD experiment at the NICA complex

Author: Adam Kisiel[1]

[1] *Warsaw University of Technology (PL)*

Corresponding Author: kisiel@if.pw.edu.pl

Monte-Carlo simulations of the baryon correlations with the MPD detector

Presentations of topics / **2**

Generation of large UrQMD Monte-Carlo datasample with MPD-Root

Author: Adam Kisiel[1]

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Corresponding Author: kisiel@if.pw.edu.pl

Generation of large datasamples using the UrQMD generator for selected collision energies, with the MPDRoot software

Presentations of topics / **3**

Generation of large vHELLE datasamples with MPDRoot

Author: Adam Kisiel[1]

[1] *Warsaw University of Technology (PL)*

Corresponding Author: kisiel@if.pw.edu.pl

Generation of the large sample of Monte-Carlo events with the vHELLE model, using the MPDRoot software and the GEANT simulation package.

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Analysis of tracking efficiency and momentum resolution for MP-DRoot

Author: Adam Kisiel[1]

[1] *Warsaw University of Technology (PL)*

Corresponding Author: kisiel@if.pw.edu.pl

Analysis of tracking and PID efficiency in large Monte-Carlo simulations with MPDRoot

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Management of large-scale physics simulations

Author: Adam Kisiel[1]

[1] *Warsaw University of Technology (PL)*

Corresponding Author: kisiel@if.pw.edu.pl

Development of tools for running and monitoring large-scale Monte-Carlo simulations of physics events, using existing physics models and large-scale computing infrastructure of JINR (LIT, NICA Cluster, others).

Presentations of topics / 6

Collaboration tools for MPD

Author: Adam Kisiel[1]

[1] *Warsaw University of Technology (PL)*

Corresponding Author: kisiel@if.pw.edu.pl

Development, testing, deployment and maintenance of the collaboration and management IT tools for large-scale scientific collaboration - case study for the MPD Collaboration. Evaluation of the common tools: Trello, Discourse, Wiki, etc.

Presentations of topics / 7

Non-organic surface modification with the solid state particle removal.

Author: Krystian Roslon[1]

[1] *Warsaw University of Technology (PL)*

Corresponding Author: krystian.roslon@cern.ch

Non-organic surface modification with the solid state particle removal. The surface will be used as an undercurrent for ongoing experiments.

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Heat transfer simulation of the MPD-TOF detector

Authors: Krystian Roslon[1]; Maciej Czarnynoga[2]

[1] *Warsaw University of Technology (PL)*

[2] *Politechnika Warszawska*

Corresponding Authors: krystian.roslon@cern.ch, maciejczarnynoga@gmail.com

The student should examine the influence of the mesh density used simulation at the maximum temperature inside the detector and determine its optimal value. Then the simulations should be compared with the actual results measured with the FLUKE TiS-20 thermal imaging camera and with the results obtained during temperature measurements with Pt-100 thermistors.

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Heat transfer simulation of the MPD-TPC detector

Authors: Krystian Roslon[1]; Maciej Czarnynoga[2]

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Corresponding Authors: krystian.roslon@cern.ch, maciejczarnynoga@gmail.com

The student should examine the influence of the mesh density used simulation at the maximum temperature inside the detector and determine its optimal value. Then the simulations should be compared with the actual results measured with the FLUKE TiS-20 thermal imaging camera and with the results obtained during temperature measurements with Pt-100 thermistors.

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Heat transfer simulation of the MPD-ITS detector

Authors: Krystian Roslon[1]; Maciej Czarnynoga[2]

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Corresponding Authors: krystian.roslon@cern.ch, maciejczarnynoga@gmail.com

The student should examine the influence of the mesh density used simulation at the maximum temperature inside the detector and determine its optimal value. Then the simulations should be compared with the actual results measured with the FLUKE TiS-20 thermal imaging camera and with the results obtained during temperature measurements with Pt-100 thermistors.

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Modeling of K+K- fermtoscopic correlations in p+Pb collision using the Therminator2 model

Author: Krystian Roslon[1]

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Modeling of K+K- fermtoscopic correlations in p+Pb collision using the Therminator2 model

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Image taken by Fluke TiS20 visualization by LabVIEW

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An interface is a shared boundary across which two or more separate components of a computer system exchange information. The exchange can be between software, computer hardware, peripheral devices, humans and combinations of these. Some computer hardware devices, such as a touchscreen, can both send and receive data through the interface, while others such as a mouse or microphone may only provide an interface to send data to a given system
Hardware interfaces exist in many of the components, such as the various buses, storage devices, other I/O devices, etc. A hardware interface is described by the mechanical, electrical and logical signals at the interface and the protocol for sequencing them (sometimes called signaling)
Software interfaces provide access to computer resources (such as memory, CPU, storage, etc.) of the underlying computer system; direct access (i.e. not through well designed interfaces) to such resources by software can have major ramifications—sometimes disastrous ones—for functionality and stability.
The Fluke Ti20 Imager (hereafter, "the Imager") is a state-of-the-art, lightweight, pistol- grip style thermal imaging unit. Using the Imager, you can obtain instant and accurate thermal images and radiometric readings from distant targets. The Imager is ergonomically designed for right-hand or left-hand use, and captures thermal images and data with a simple trigger press. The Imager can store up to 50 images that can be downloaded to your personal computer for storage, analysis, and report preparation.
The InsideIR companion software application, lets you display, examine, and analyze your images and data to determine qualitative and quantitative trends associated with the target equipment. You can also use InsideIR to define maintenance databases based on your equipment conditions, monitoring, and asset management needs.
The Imager provides high performance thermal imaging and is designed for industrial use. The Ti20:
• Uses new detection technology to provide a clear thermal image with accurate temperature measurements up to 350 ℃ (662 °F).
• Is protected against dust and moisture (IP54 rated) for use in harsh industrial environments.
• Provides a minimum of 3 hours of continuous battery life.

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Development of software for monitoring temperature inside the MPD-TOF detector

Author: Krystian Roslon[1]

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Corresponding Author: krystian.roslon@cern.ch

The main task of the student will be to design the execution and software of the electronic system for measuring and monitoring the temperature of the detector elements based on platinum Pt100 thermoresistors. In order to acquire data, the student should use LabVIEW software and LUMEL SM1 modules. As part of the implementation of the subject of engineering work, there should also be a

PCB design that implements the multiplexer task, which will be used in measuring the temperature inside the MPD-TOF detector.

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Android application for monitoring data from the Slow Control System for the TOF-MPD detector

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Corresponding Author: krystian.roslon@cern.ch

Android application for monitoring data from the Slow Control System for the TOF-MPD detector

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Integration of temperature monitoring software inside RACK Master and Slave 19 "cabinets for the Slow Control System for the TOF-MPD detector

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[1] *Warsaw University of Technology (PL)*

Corresponding Author: krystian.roslon@cern.ch

Integration of temperature monitoring software inside RACK Master and Slave 19 "cabinets for the Slow Control System for the TOF-MPD detector

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Studies of the MPD/TOF detector efficiency and time resolution for varying gas mixture components concentration.

Author: Daniel Dabrowski[1]

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Corresponding Author: daniel.dabrowski@cern.ch

Studies of the MPD/TOF detector efficiency and time resolution for varying gas mixture components concentration.

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Mobile application for the MPD/TOF Gas System monitoring

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Corresponding Author: daniel.dabrowski@cern.ch

Mobile application for the MPD/TOF Gas System monitoring

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Model of the MPD Multi-Detector prepared with a 3D printing method

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Model of the MPD Multi-Detector prepared with a 3D printing method

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Development of the SCADA software for MPD/TOF Gas System in the Simens WinCC

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Development of the SCADA software for MPD/TOF Gas System in the Simens WinCC

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Development of the PLC controller software for the Mixer module of the MPD/TOF Gas System

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Development of the PLC controller software for the Mixer module of the MPD/TOF Gas System

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Development of the PLC controller software for the Recirculation module of the MPD/TOF Gas System

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Corresponding Author: daniel.dabrowski@cern.ch

Development of the PLC controller software for the Recirculation module of the MPD/TOF Gas System

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Simulation of the MPD/TOF Gas System operation in the Fluidsim environment

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Simulation of the MPD/TOF Gas System operation in the Fluidsim environment

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Emergency situations testing and error handling of the MPD/TOF Gas System control software

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Emergency situations testing and error handling of the MPD/TOF Gas System control software

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Development of the data logging, archiving and exporting to database parameters of the MPD/TOF Gas System control software

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Development of the data logging, archiving and exporting to database parameters of the MPD/TOF Gas System control software

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Pressure transmitters, mass flow controllers and control valves calibration and preparation for operation

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Pressure transmitters, mass flow controllers and control valves calibration and preparation for operation

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Gas Supply project for the MPD/TOF Gas System

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Gas Supply project for the MPD/TOF Gas System

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Software development for MPD

Author: Yuriy Konstantinovich Potryebennikov[None]

Software development for MPD

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Setup of the NICA computing cluster

Authors: Yuriy Konstantinovich Potrebyennikov[None]; Boris Georgyevich Shchinov[None]; Ilya Vyacheslavovich Slepnov[None]; Andrey Genadyevich Dolbilov[None]

Setup of the NICA computing cluster

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TPC detector construction

Author: Sergey Aleksandrovich Movchan[None]

TPC detector construction

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TPC read-out chambers development

Author: Sergey Aleksandrovich Movchan[None]

TPC read-out chambers development

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Group collaboration tools for the software of MPD

Author: Oleg Vasilievich Rogachevsky'[None]

Group collaboration tools for the software of MPD

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Inner tracker development

Author: Yuriy Andreevich Murin[None]

Inner tracker development

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Model of the MPD detector

Author: Bartłomiej Juruć[None]

Complementation of the MPD detector's technical sketches and simplified parts in 2D and 3D programs

Opis ćwiczenia.

Based on the actual dimensions of the MPD detector, make a model of it on an appropriate scale.

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Dosimetry setup prototype design for NI myRIO embedded device

Author: Nikita Dunin[None]

Design of Geiger counter module for nuclear and radiation safety using myRIO embedded controller

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Remote control development for LabVIEW projects

Author: Nikita Dunin[None]

Creating software for remote control of LabVIEW projects(using web servers solutions or LabVIEW NXG) and basic integration with existed systems include fire protection system, magnetic measurements, Geiger counters and temperature sensors

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Naming and numbering application development for Equipment Database

Author: Michalina Milewicz-Zalewska[None]

Corresponding Author: milevich@jinr.ru

Development of an offline application in Python (preferably) for IOS, Android and Windows. Application should generate part identifiers according to naming and numbering convention of the NICA project.

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Fiber Optics splicing

Author: Michalina Milewicz-Zalewska[None]

Fiber Optics preparation, measurement and splicing.

General information / 38

Why did you come to Dubna?

Author: Marek Peryt[1]

[1] *Warsaw University of Technology*

Corresponding Author: marekperyt@if.pw.edu.pl

Organizational matters, what we do in Dubna in JINR.

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Automatic, multipoint, high precision system for temperature measurement.

Author: Marcin Bielewicz[1]

Co-authors: Krystian Roslon [2]; Marek Peryt [3]

[1] *Nacional Centre for Nuclear Research*

[2] *Warsaw University of Technology (PL)*

[3] *Warsaw University of Technology*

Corresponding Author: marcin.bielewicz@ncbj.gov.pl

Goal:
In the nuclear processes main interest is the level of energy production. One of the methods of determining this value is a multi-point, high precision measurement of temperature change. The goal of this project is to design a measuring system that solves the problem described. Then the manual preparation of the measuring device, make a software for it and to perform a real temperature measurements. We use temperature high precision sensors type Pt 100, and LUMEL measurement modules. The set should be programmed for online working with the computer control. We will use the LabView environment for it. The set will be useful for calibration other less precision systems.

Description of the exercise:
1. Discussion of the issue of ADS reactors and temperature measurement.
2. Visiting of experimental site and the accelerators site.
3. Construction of an electronic measuring system (based on ready-made components) based on high precision PT100 platinum sensors and the RS-485 protocol.
4. Create Measuring system software (or upgrade of existing software) using the LabView environment.
5. Calibration of the measuring system.
6. Temperature measurements, normalization of results and their comparison with other results - practical analysis of the obtained results.
7. Preparation the own speech at the end of the student practice and for the conference after that, and preparation the publication together with the practice supervisor based on the obtained results.

Requirements for the students:
The subject is addressed to students interested in electronics, practical measuring systems and nuclear physics.
Basic knowledge of electronic layout.
Basic skills in using Excel program and the LabView environment.

Exercise for up to 4 students

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Cosmic ray measurements - using those detectors in huge physical experiments as LHC or NICA.

Author: Marcin Bielewicz[1]

[1] *Nacional Centre for Nuclear Research*

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Goal:
Large detectors like ALICE in CERN are often equipped with additional cosmic ray detectors. These detectors are used to obtain information about which tracks inside the detector came from the passage of a particle coming from an atmospheric cascade (eg: muons), and are not as a product of an internal collision. They are also very useful for calibrating detectors such as TOF or TPC. The nature of radiation changes in relation to the direction in the sky which we observe as well as the influence of very thick walls or ground. The goal of this exercise is to self build a small cosmic ray detector and making real measurements using it, and analyzed received results.

Description of the exercise:
1. Discussion of the issue of wide atmospheric showers and cosmic irradiation.
2. Construction of a small detector based on a scintillator and optical element SiPM type.
3. Carrying out measurements of cosmic radiation and determining the azimuth angle and the environment dependence.
4. Understanding the "arduino"control system and its programming.
5. Presentation the Cosmic Watch and CREDO program and the new cosmic radiation detector for the NICA collider (MCORD).
6. Preparation the own speech at the end of the student practice and for the conference after that, and preparation the publication together with the practice supervisor based on the obtained results.

Requirements for the students:
The subject is addressed to students interested: practical measurement systems, astrophysics, nuclear physics and electronics.
Basic knowledge of electronic layout.
Basic skills in using Excel program.

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Experimental measurement of the level of transmutation and neutron flux density in subcritical nuclear reactors ADS.

Author: Marcin Bielewicz[1]

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Corresponding Author: marcin.bielewicz@ncbj.gov.pl

Goal:
Nuclear reactors type III and III + dominate on the world, currently. Safety considerations, as well as the increasing requirements, are reason on intensive research on type IV reactors. An example of it, is the subcritical nuclear reactor controlled by a beam from the accelerator "ADS". The key issue in the design of such reactors is the knowledge of the neutron flux density values inside the reactor. Consider methods for determining the level of transmutation in subcritical reactors by using nuclear threshold reactions to determine the density of fast neutron fluxes. The goal will be to perform practical measurements using germanium detectors, calibration of results and their analysis.

Description of the exercise:
1. Discussion of the differences (advantage and disadvantage) of various types of nuclear reactors compared to subcritical accelerator-controlled reactors
2. Participation in the experiment (if such will take place during the practice), and visiting of experimental site and the accelerators site.
3. Measurements of the samples gamma spectrum on germanium detector and detector calibration

procedure. Samples irradiated in time of the experiment.
4. Analysis of obtained gamma spectra (Deimos program) and identification of isotopes.
5. Determination of the isotope content in the samples.
6. Normalization of results and their comparison with other results - practical analysis of the results obtained.
7. Determination of neutron flux density with energy above 10 MeV.
8. Preparation the own speech at the end of the student practice and for the conference after that, and preparation the publication together with the practice supervisor based on the obtained results.

Requirements for the students:
The topic is addressed to students interested in nuclear experimental physics using large research equipment and/or nuclear energetic.
Basic knowledge of nuclear physics
Basic skills in using Excel program.

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Installation and implementation of JIRA and Confluence ATLASSIAN platforms for the Engineering Support for NICA Group.

Authors: Viacheslav Golovatyuk[1]; Adam Kisiel[2]; Michalina Milewicz-Zalewska[3]; Marek Peryt[4]; Krystian Rosłon[None]

Co-authors: Vadim Babkin [5]; Marcin Bielewicz [6]; Maciej Czarnynoga [7]; Daniel Dabrowski [4]; Nikita Dunin [5]; Bartlomiej Juruc

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Goal:
R & D (research and development) works and installation of the Jira and Confluence ATLASSIAN platform, implementation of the NICA-MPD-PLATFORM project management system.

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Drive x, y, z.

Authors: Adam Kisiel[1]; Bartlomiej Juruc[None]; Daniel Dabrowski[2]; Krystian Rosłon[None]; Maciej Czarnynoga[3]; Marcin Bielewicz[4]; Marek Peryt[2]; Michalina Milewicz-Zalewska[5]; Nikita Dunin[6]; Vadim Babkin[7]; Viacheslav Golovatyuk[7]

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Goal:
R & D (research and development) we expect that a solution made in the technology of BOSCH aluminum profiles will be proposed, easy to adapt to various applications. We expect that the designed solution will allow to study areas up to 3x3x10mb. The drive system is National Instruments stepper motors, LabView control, Ethernet interfaces.

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Drive r, φ.

Authors: Adam Kisiel[1]; Maciej Czarnynoga[2]; Marek Peryt[3]; Michalina Milewicz-Zalewska[4]; Viacheslav Golovatyuk[5]

Co-authors: Daniel Dabrowski [3]; Krystian Rosłon ; Marcin Bielewicz [6]; Nikita Dunin [7]

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Goal:
R & D (research and development) and implementation of a real prototype drive system for various sensors in the coordinate system: r, φ. We expect that a solution made in the technology of BOSCH aluminum profiles will be proposed, easy to adapt to various applications. We expect the designed solution to study areas up to 3mb x 2π. The drive system is National Instruments stepper motors, LabView control, Ethernet interfaces.

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Laboratory infrastructure

Authors: Daniel Dabrowski[1]; Krystian Rosłon[None]; Maciej Czarnynoga[2]; Marcin Bielewicz[3]; Marek Peryt[1]; Michalina Milewicz-Zalewska[4]; Nikita Dunin[5]

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Goal:
R & D (research and development) and implementation, and modernization of installations making up the Laboratory's infrastructure. The task includes: laying of cables, IT and earthing pipes. Designing and laying routes and cable tunnels for the entire Lab42 installation, detectors and devices dedicated to the experiment.

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EqDb Equipment Database.

Authors: Viacheslav Golovatyuk[1]; Adam Kisiel[2]; Michalina Milewicz-Zalewska[3]; Marek Peryt[4]; Tomasz Traczyk[2]

Co-authors: Vadim Babkin [5]; Marcin Bielewicz [6]; Maciej Czarnynoga [7]; Daniel Dabrowski [4]; Nikita Dunin [5]; Krystian Rosłon

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Goal:
R & D (research and development) of EqDb Equipment Database, associated with the NICA Project. The Database Equipment database is at the stage of implementation and data filling. Test designed forms and the idea of data and process organization. Propose and test data recording from and to the Slow Control System.

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NICA-MPD-PLATFORM (NMP)

Authors: Daniel Dabrowski[1]; Viacheslav Golovatyuk[2]; Marek Peryt[1]; Krystian Rosłon[None]

Co-authors: Vadim Babkin [3]; Marcin Bielewicz [4]; Maciej Czarnynoga [5]; Nikita Dunin [3]; Bartlomiej Juruc ; Adam Kisiel [6]; Maciej Lawrynczuk [7]; Michalina Milewicz-Zalewska [8]; Tomasz Traczyk [6]

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Goal:
R & D (research and development) substantive and practical implementation of Students in design work NICA-MPD-PLATFORM. This is currently the largest project implemented in the Engineering Support group. The designed RACKs will include all power and control of the MPD detector.

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NMP Configurable screen for the control room.

Authors: Adam Kisiel[1]; Maciej Lawrynczuk[2]; Marek Peryt[3]; Tomasz Traczyk[1]; Viacheslav Golovatyuk[4]

Co-authors: Daniel Dabrowski [3]; Krystian Rosłon ; Maciej Czarnynoga [5]; Marcin Bielewicz [6]; Michalina Milewicz-Zalewska [7]; Nikita Dunin [8]; Vadim Babkin [8]

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Goal:
R & D (research and development) a prototype of a large screen presenter, composed of at least 4x3 (ie 12 screens), easily switched and configured in various tables for data presentation and processes in the Slow Control System for NICA-MPD-PLATFORM.

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NMP SCADA WinCC

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Co-authors: Daniel Dabrowski [3]; Krystian Rosłon ; Maciej Czarnynoga [5]; Marcin Bielewicz [6]; Michalina Milewicz-Zalewska [7]; Nikita Dunin [8]; Tomasz Traczyk [1]; Vadim Babkin [8]

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Goal:
R & D (research and development) and implementation of a control system, data presentation and processes on the SCADA WinCC platform, using the SIMENS industrial controllers for the NICA-MPD-PLATFORM.

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NMP Cable tester

Authors: Daniel Dabrowski[1]; Krystian Rosłon[None]; Maciej Czarnynoga[2]; Marcin Bielewicz[3]; Marek Peryt[1]; Michalina Milewicz-Zalewska[4]; Nikita Dunin[5]; Vadim Babkin[5]; Viacheslav Golovatyuk[6]

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Goal:
R & D (research and development) and implementation of the cable tester prototype for NICA-MPD-PLATFORM.

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NMP Grounding monitoring

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Co-authors: Vadim Babkin [5]; Marcin Bielewicz [6]; Maciej Czarnynoga [7]; Daniel Dabrowski [4]; Nikita Dunin [5]; Michalina Milewicz-Zalewska [8]; Krystian Rosłon

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Goal:
R & D (research and development) and implementation of a prototype of the earth circuit monitoring system for NICA-MPD-PLATFORM.

Presentations of topics / 53

NMP IPD Intelligent Power Distributor

Authors: Maciej Lawrynczuk[1]; Marek Peryt[2]; Rami Faraj[None]; Tomasz Kowalski[None]; Viacheslav Golovatyuk[3]

Co-authors: Adam Kisiel [4]; Daniel Dabrowski [2]; Krystian Rosłon ; Maciej Czarnynoga [5]; Marcin Bielewicz [6]; Michalina Milewicz-Zalewska [7]; Nikita Dunin [8]; Tomasz Traczyk [4]; Vadim Babkin [8]

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Goal:
R & D (research and development), functional measurements and operational tests of the Intelligent Power Distributor for NICA-MPD-PLATFORM.

Presentations of topics / 54

NMP InteliPhy

Authors: Wojciech Lis[1]; Adam Kisiel[2]; Maciej Lawrynczuk[3]; Marek Peryt[4]; Nikita Dunin[5]; Tomasz Traczyk[2]; Viacheslav Golovatyuk[6]; Jan Sobolewski[1]

Co-authors: Daniel Dabrowski [4]; Krystian Rosłon ; Maciej Czarnynoga [7]; Marcin Bielewicz [8]; Michalina Milewicz-Zalewska [9]; Vadim Babkin [5]

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Goal:
R & D (research and development) implementation of a cable connection monitoring system for NICA-MPD-PLATFORM.

Presentations of topics / 55

NMP Monitoring of the Earth's magnetic field

Authors: Adam Kisiel[1]; Konrad Krawczyk[None]; Marek Peryt[2]; Viacheslav Golovatyuk[3]

Co-authors: Daniel Dabrowski [2]; Krystian Rosłon ; Maciej Czarnynoga [4]; Maciej Lawrynczuk [5]; Marcin Bielewicz [6]; Michalina Milewicz-Zalewska [7]; Nikita Dunin [8]; Tomasz Traczyk [1]; Vadim Babkin [8]

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Goal:
R & D (research and development) and implementation of the Earth's magnetic field monitoring system for NICA-MPD-PLATFORM.

Presentations of topics / **56**

NMP Alpha, beta, gamma monitoring

Authors: Adam Kisiel[1]; Krystian Rosłon[None]; Marcin Bielewicz[2]; Marek Peryt[3]; Nikita Dunin[4]; Viacheslav Golovatyuk[5]

Co-authors: Daniel Dabrowski [3]; Maciej Czarnynoga [6]; Maciej Lawrynczuk [7]; Michalina Milewicz-Zalewska [8]; Tomasz Traczyk [1]; Vadim Babkin [4]

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Goal:
R & D (research and development) and implementation of the alpha, beta and gamma radiation monitoring system and dosimetry for NICA-MPD-PLATFORM.

Presentations of topics / **57**

Design and heat transfer simulations for the TOF_MPD detector cooling systemDesign and heat transfer simulations for the tof-mpd detector cooling system

Author: Maciej Czarnynoga[1]

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Design and heat transfer simulations for the TOF-MPD detector cooling system

Presentations of topics / 58

Heat transfer simulations for the PXI module and the CAEN module

Author: Maciej Czarnynoga[1]

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heat flow simulations for the Pxi module and the CAEN module

Presentations of topics / 59

NMP Access Control

Authors: Jan Sobolewski[1]; Marek Peryt[2]; Tomasz Traczyk[3]; Viacheslav Golovatyuk[4]; Wojciech Lis[1]

Co-authors: Adam Kisiel [3]; Daniel Dabrowski [2]; Krystian Rosłon ; Maciej Czarnynoga [5]; Maciej Lawrynczuk [6]; Marcin Bielewicz [7]; Michalina Milewicz-Zalewska [8]; Nikita Dunin [9]; Vadim Babkin [9]

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Goal:
R & D (research and development) and implementation of the ACS prototype for NICA-MPD-PLATFORM.

Presentations of topics / 60

NMP Temperature monitoring

Authors: Krystian Rosłon[None]; Maciej Czarnynoga[1]; Maciej Lawrynczuk[2]; Marek Peryt[3]; Viacheslav Golovatyuk[4]

Co-authors: Adam Kisiel [5]; Daniel Dabrowski [3]; Marcin Bielewicz [6]; Michalina Milewicz-Zalewska [7]; Nikita Dunin [8]; Tomasz Traczyk [5]; Vadim Babkin [8]

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Goal:
R & D (research and development) and implementation of temperature monitoring system for NICA-MPD-PLATFORM.

Presentations of topics / 61

NMP Environmental monitoring MPD

Authors: Adam Kisiel[1]; Maciej Czarnynoga[2]; Maciej Lawrynczuk[3]; Marek Peryt[4]; Tomasz Traczyk[1]; Viacheslav Golovatyuk[5]

Co-authors: Daniel Dabrowski [4]; Krystian Rosłon ; Marcin Bielewicz [6]; Michalina Milewicz-Zalewska [7]; Nikita Dunin [8]; Vadim Babkin [8]

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Goal:
R & D (research and development) stabilization of environmental conditions for NICA-MPD-PLATFORM.

Presentations of topics / 63

NMP GPS Synchronization

Authors: Adam Kisiel[1]; Maciej Czarnynoga[2]; Maciej Lawrynczuk[3]; Marek Peryt[4]; Tomasz Traczyk[1]; Viacheslav Golovatyuk[5]

Co-authors: Daniel Dabrowski [4]; Krystian Rosłon ; Marcin Bielewicz [6]; Michalina Milewicz-Zalewska [7]; Nikita Dunin [8]; Vadim Babkin [8]

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Goal:
R & D (research and development) and implementation of a time synchronization system for c-RIO cassettes operating in real time, using synchronization and GPS servers, for NICA-MPD-PLATFORM.

TeFeNICA and Slow Control final presentations / 64

Software for device designed to measure radiation absorption of various materials

Authors: Maciej Marcinkiewicz[None]; Michał Foltys[1]

Co-author: Marek Peryt [2]

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Presentation about software that was made on Slow Control Summer Practise 2019.
Written in LabView, allows both common user and enginner to fully control the device designed to measure radiation absorption of various materials.
Main functions:
- Start and stop measure
- Reset the device
- Read and save measure data
- Que the measures

TeFeNICA and Slow Control final presentations / 65

Temperature sensors for controlling the drive in NiMyRIO technology

Author: Mateusz Samsel[1]

Co-author: Marek Peryt [2]

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The presentation talks about the designed device,based on NiMyRio technology, which can control the motor drive using the PWM signal, based on the measurements of temperature. It presents

the technological solutions used in project to get the basic functionalities and also to increase the stability of the device.

TeFeNICA and Slow Control final presentations / 66

Naming and Numbering Convention for the NICA Project Part Identification & Generic Scheme

Authors: Jakub Mrówczyński[1]; Adam Biegański[1]; Michalina Milewicz-Zalewska[2]

[1] *Warsaw University of Technology*

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Corresponding Authors: kuba.mrowka1@gmail.com, bieganski19@gmail.com

Aim of our project was to create a multi-platform application which will enable identifying and stock-taking every single component used in NICA project. To achieve that we created Windows and Android mobile application which allows user to get acquaintance with NICA coding convention and generate or decode unique 10-character code of component given according to coding lists. Thanks to the application performing EqDb database shall become much more efficient and safer.

TeFeNICA and Slow Control final presentations / 67

ON-OFF control module with thermistor , using NImyrio

Author: Paweł Duda[None]

Co-author: Marek Peryt [1]

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Corresponding Author: pawel.ludwik.duda@gmail.com

Title: ON-OFF control module with thermistor , using NImyrio

The presentation talks about using a thermistor to mesure the temperature, using the Steinhart-Hart equation.It can be used to control components such as LEDs , buzzers etc.

TeFeNICA and Slow Control final presentations / 68

Time synchronization of electronic devices in RACKs NICA-MPD-PLATFORM using GPS NI-9467-c-RIO

Authors: Piotr Sawicki[None]; Kamil Chęć[None]

Corresponding Authors: psrubing@gmail.com, k.chec.prv@gmail.com

In order to provide the same time to every devices there is a need to construct special system. In NICA project synchronization will be managed by GPS. System designers can use this module for accurate data timestamping, system clock setting, gating data acquisition based on the arrival of the PPS and synchronizing global waveform acquisition data using the FPGA.

TeFeNICA and Slow Control final presentations / 69

Call for Abstracts Time synchronization of electronic devices in RACKs NICA-MPD-PLATFORM using GPS NI-9467-c-RIO

Authors: Kamil Chęć[None]; Piotr Sawicki[None]

Corresponding Authors: k.chec.prv@gmail.com, psrubing@gmail.com

In order to provide the same time to every devices there is a need to construct special system. In NICA project synchronization will be managed by GPS. System designers can use this module for accurate data timestamping, system clock setting, gating data acquisition based on the arrival of the PPS and synchronizing global waveform acquisition data using the FPGA.

TeFeNICA and Slow Control final presentations / 70

Upgrade of the MPD/TOF Test Stand Gas System and Control Software

Author: Filip Mąkolski[None]

Co-author: Daniel Dabrowski [1]

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Corresponding Author: f.makolski@gmail.com

During my practice I was developing the gas system for MPD/TOF test stand, and it's control software. I've modified some elements in the gas instalation. In order to provide proper functioning of the devices they needed PID controllers. To choose proper settings of the PID controllers I've used the Ziegler-Nichols method. Conducted software tests turned positive. System works properly and can be further developed.

TeFeNICA and Slow Control final presentations / 71

Development of visualisation for MPD experiment

Authors: Mateusz Kowal[1]; Adam Kisiel[2]

Co-authors: Michalina Milewicz-Zalewska [3]; Marek Peryt [4]; Nikita Dunin [5]; Krystian Roslon [2]; Maciej Czarnynoga [6]; Daniel Dabrowski [2]

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Monte Carlo simulation plays a significant role in particle physics. Therefore, it is important that the geometry of MPD components in software needs to be as close to real as possible. Visualising simulations helps to create actual projection of detector and generated particles. The Cosmic Ray Detector reduces the amount of muons counted for analysis by detecting cosmic radiation. With

given geometry and functional code it can be added to MPD simulation.
During presentation geometry of MPD will be shown as well as exemplary visualisation of collisions. The process of simulating events will be explained.

TeFeNICA and Slow Control final presentations / 72

Monitoring and stabilisation inside the testing laboratory of MPD - TOF

Authors: Klaudia Pachulska[1]; Jędrzej Kołaś[None]

Co-author: Krystian Roslon [2]

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- General description of the whole system, list of it's components and the importance of the system in the NICA project.
- Schematics of the temperature and humidity monitoring system inside 19" RACK cabinets.

TeFeNICA and Slow Control final presentations / 73

Implementation of THERMINATOR generator to the MpdRoot environment.

Author: Maksymilian Odziemczyk[None]

Co-author: Adam Kisiel [1]

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Presentation will be about how THERMINATOR generator was connected to the MpdRoot environment, how to use it itself with/and possible perspectives. Results accomplished from using THERMINATOR will be presented as well. If applicable, audience will be able to ask a several questions.

TeFeNICA and Slow Control final presentations / 74

α, β, γ radiation monitoring in the working area of the MPD Slow Control electronic equipment

Authors: Alicja Jakubowska[1]; Marta Robak[None]; Anita Zagrobelna[None]; Nikita Dunin[2]

Co-authors: Marcin Bielewicz [3]; Daniel Dabrowski [4]; Adam Kisiel [4]; Michalina Milewicz-Zalewska [5]; Marek Peryt [2]; Krystian Roslon [4]

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Project focuses on α, β, γ radiation monitoring. Firstly, three Gamma-Scout detectors were tested whether the measurements taken in the same location are equal within 5% uncertainty. Next, detectors where moved to three different locations. Data collected from those locations in three available working modes (detection of γ, β+γ and α+β+γ radiation) was analyzed to determine potential influence of the rack's case on radiation levels. Also, based on received data of radioactive sources (Eu-152 and Thorium), tested using Radateh photoelectronic detector, three spectrograms were generated and compared, to conclude best utility of each type of detector. Further tasks involved developing software for a self-built Geiger-Müller counter using NI myDAQ and LabVIEW environment.

TeFeNICA and Slow Control final presentations / 75

Optical gate of asynchronous work interruptions of the measuring system with acoustic signaling in NIMyRIO technology

Author: Tomasz Gniazdowski[1]

Co-authors: Marek Peryt [2]; Krystian Roslon [3]; Michalina Milewicz-Zalewska [4]; Daniel Dabrowski [3]; Adam Kisiel [3]; Jan Marian Pluta [3]; Maciej Czarnynoga [5]

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Presentation contains information about created interrupting system. It is focused on hardware configuration, technology used in project, principle of operation, software created in LabVIEW and applicability in other electronic systems.

TeFeNICA and Slow Control final presentations / 76

Study of magnetic field in MPD surrounding

Authors: Paulina Marikin[1]; Jakub Głuch[None]; Marek Peryt[2]

Co-authors: Adam Kisiel [3]; Michalina Milewicz-Zalewska [4]; Nikita Dunin [5]; Maciej Czarnynoga [6]; Krystian Roslon [3]; Daniel Dabrowski [3]

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Research and development of monitoring software to measure and save data of the Earth's magnetic field for NICA-MPD-PLATFORM. Creation of system with use of magnetometer MAG3110 and NI myRio. Creation of the software to collect, record magnetic field and calibrate measurements.

TeFeNICA and Slow Control final presentations / 77

Implementation of THERMINATOR generator in the MpdRoot environment.

Author: Filip Jakubczak[None]

Co-authors: Maksymilian Odziemczyk ; Adam Kisiel [1]

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Corresponding Authors: filip.jakubczak97@gmail.com, maksymilian.odziemczyk@gmail.com, kisiel@if.pw.edu.pl

Presentation will be about how THERMINATOR generator was implemented in the MpdRoot environment, how to use it and perspectives for the future. Results accomplished with THERMINATOR will be presented as well. If applicable, audience will be able to ask some questions.

TeFeNICA and Slow Control final presentations / 78

XYZ Scanner

Author: Witold Olech[None]

Co-author: Marek Peryt [1]

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Topic of presentation is XYZ Scanner. There is a mechanical structure which allows to place a gauge (eg. Magnetometer) in a specified point in space. Motion is realised by step motors.

TeFeNICA and Slow Control final presentations / 79

Application of PROOF system to optimization processes of physical analysis for the MPD experiment

Author: Kacper Skelnik[None]

Corresponding Author: kacske@wp.pl

Main goal of my pressentation is to show: basic of developing a TSelector, automatization of processes of physical analysis (from users perspective), results (speed up, data quality, efficiency). I going to discuss nowadays benefits of using PROOF (in the simplest version), and few ideas for the future

TeFeNICA and Slow Control final presentations / 80

Quality Assurance of particle collision simulation in MPDRoot

Author: Aleksandra Mazur[None]

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Program to analyze simulated data from .root files, which are available on PCs or NICA cluster system (2 versions) by creating histograms of:

- multiplicity
- transverse momentum
- polar angle
- pseudorapidity
- pseudorapidity in a function of polar angle.

TeFeNICA and Slow Control final presentations / 81

Development and optimization of detector visualization and MPD data

Author: Arkadiusz Czarnecki[1]

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To properly simulate what happens after two particles collide in a detector one needs a properly modeled geometry of said machine. For later physical analysis it is important to know exactly what are its dimensions, where is it located in space, where are the particles located, what tracks did they leave. Also knowing how to add new detector or detector parts and where to put them in the code is important as well.

TeFeNICA and Slow Control final presentations / 82

Analysis of background radiation with a scintillation counter

Authors: Kamila Kempny[None]; Paweł Dębowski[None]; Anna Kierznowska[None]

Corresponding Authors: kamilakem1@hotmail.com, pawdeb42@gmail.com, anna.kierznowska2@gmail.com

The project concerns an analysis of background radiation with a scintillation counter. It included a series of measurements in different external conditions and attitude of the device. The analysis and comparison of the results was carried out in terms of the use of the device in the NICA project. Conclusions pointed out some of device's flaws which should be taken into consideration during the final experiment.

TeFeNICA and Slow Control final presentations / 83

Implementation of algorithms for reconstruction and identification of baryons, including strange baryons, in MPD experiment

Author: Jakub Zielinski[1]

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In experiments like MPD, that study behaviour of particles, it is important to correctly identify registered particles. One problem is the identification of particles that generate signal in detector. Second is the reconstruction of baryons, that have life span too short to reach detectors.

The presentation will start with brief explanation of particle physics that was used in studies. The process of identification and the idea behind reconstructing strange baryons from the data available will be explained. Main findings of the study will be presented. In conclusion will be presented possible improvements in both processes.

TeFeNICA and Slow Control final presentations / 84

Modelling Au-Au collisions in NICA collider energy spectrum using MPD programming environment

Authors: Marta Monikowska[None]; Maja Tureczek-Zakrzewska[None]

Corresponding Authors: marta.monikowska@samorzad.if.pw.edu.pl, majatureczekzakrzewska@gmail.com

The main goal of this work was to perform Au+Au collisions generated within UrQMD model for different energies of NICA beam energy range. In order to obtain events generations, as well as physical analysis MPDroot environment was used. All the work was automatized via created macros and performed at NICA cluster. Simulations were held for intermediate energies of 4,7,9 and 11GeV.

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Integration of the Therminator model with the MpdRoot environment

Author: Robert Mikoś[None]

Corresponding Author: robertmikos11@gmail.com

THERMal heavy-IoN generATOR (Therminator) is a model of Monte Carlo event generator for simulating collisions of heavy particles. The code is written in the object-oriented c++ language. In the MpdROOT environment simulations were launched for one and two events. Small code changes have been made to improve Therminator efficiency. Work is underway on the proper functioning of it on the Cluster. There are plans for the future to optimization of MpdTherminatorGenerator source and header file.

TeFeNICA and Slow Control final presentations / 86

Integration of temperature monitoring software inside the Master and Slave 19 "RACK cabinets for the Slow Control System of the MPD-TOF detector

Authors: Monika Kutyła[1]; Krystian Rosłon[None]

Co-authors: Michalina Milewicz-Zalewska [2]; Marek Peryt [1]; Marcin Bielewicz [3]; Nikita Dunin [4]; Daniel Dabrowski [1]

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To avoid getting dust inside RACKs it was decided to close them as hermetically as possible and provide the closed air loop venntilation. In each cabinet there are temperature and humidity transducers , fans modules and radiators. Using RS-485 standard based on the MODBUS protocol and modules of logic outputs, fans are being switched on and off depending on temperature inside each RACK and their work time. The cabinets are working in master-slave configuration. Software is easy to adjust to load settings from database.

TeFeNICA and Slow Control final presentations / 87

Modelling Au-Au collisions in NICA collider energy spectrum using MPD programming environment

Authors: Marta Monikowska[None]; Maja Tureczek-Zakrzewska[None]

Corresponding Authors: marta.monikowska@samorzad.if.pw.edu.pl, majatureczekzakrzewska@gmail.com

The main goal of this work was to perform Au+Au collisions generated within UrQMD model for different energies of NICA beam energy range. In order to obtain events generations, as well as physical analysis MPDroot environment was used. All the work was automatized via created macros and performed at NICA cluster. Simulations were held for intermediate energies of 4,7,9 and 11GeV.

88

Management of the Monte Carlo simulation process in the MPD experiment on the NICA cluster

Author: Łukasz Sawicki[None]

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The presentation shows the problem of mass simulation and generation of Monte Carlo particle collisions in the MPD experiment. It contains information about the tools used and how to solve the problem, next stages of work, the current outline of the program and a summary of the amount of simulated data were described.

TeFeNICA and Slow Control final presentations / 90

R&D of the r, φ scanner mechanical construction for the scintillator detector background radiation measurements

Authors: Marek Peryt[1]; Maciej Czarnynoga[2]; Monika Nadolna[None]; Martyna Winnik[None]

Co-authors: Marcin Bielewicz [3]; Daniel Dabrowski [1]; Nikita Dunin [4]; Adam Kisiel [5]; Michalina Milewicz-Zalewska [6]; Krystian Roslon [5]

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The aim of this project is the introduction to research and development of a prototype drive system for various sensors in the r, φ coordinate system. The device was designed for extensive solutions, but in this case, the focus was particularly on the cosmic ray measurement system. An extremely important issue was the easiest possible adaptatability to various applications, therefore the proposed solution was made mostly in the technology of aluminum profiles. The designed solution is expected to study areas up to 1m in length and 2π angle. After auspicious prototype tests and meeting the primary assumptions, the final device is assumed to examine the expanse up to 3m in length and 2π angle. The continuation and further progress of the project will consist of the manual preparation of the measuring device, software development and real cosmic ray measurements performance.

TeFeNICA and Slow Control final presentations / 91

The prototype of an air based cooling system for the Slow Control System of the MPD-TOF detector

Authors: Anna Szumigała[None]; Michał Maciałowicz[None]; Krystian Roslon[1]

Co-authors: Marcin Bielewicz [2]; Daniel Dabrowski [1]; Nikita Dunin [3]; Adam Kisiel [1]; Michalina Milewicz-Zalewska [4]; Marek Peryt [3]

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In order to keep RACKs clean of any dust and other particles, the decision has been made to hermetically close them off from the environment. This however can lead to overheating of electronic devices inside. Due to that, a special cooling system was designed. It consists of two sets of fans, two transducers (measuring temperature and humidity) and radiators. All the elements are connected to a computer with the usage of RS-485 wires and the MODBUS protocol. The main goal of this project was to prepare, assemble and install all of the aforementioned equipment.

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Embedded data processing using Xilinx SoC and LabVIEW for magnetic field measurements

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The task concerned the improvement of operation of the magnetic field measurement system, containing the MAG3110 magnetometer. LCD screen has been connected to the system in order to display the measurement results. Data logging to a USB drive connected directly to the MyRIO system has been configured.
The sensor has been calibrated.

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Data aquisition from spectrometry and dosimetry systems using LabView environment

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During one month of work we focused on completing two main tasks. One of them was to modify existing software programs for three types of detectors: SiPM spectrometer, Geiger- Mueller counter and Gamma-Scout dosimeters. All the programming was done in LabView graphical development environment. Our second assignment was to measure radiation intensity in three different surroundings: inside the rack, inside the building and outside the building. The aim was to measure the background radiation which would be needed for correct interpretation of data aquired during NICA experiment. We used dosimeters connected to computers by USB interface. All data was compared and statistically analysed. Except that, we connected all dosimeters to Ethernet to extend range of future measurements.

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Time synchronization of electronic devices in RACKs NICA-MPD PLATFORM using GPS NI-9467 cRIO

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The aim of this project is to provide reflexive insight into the problem of time synchronization of electronic devices in the NICA MPD PLATFORM. The method which we propose is the Precision Time Protocol (PTP), as an addition to GPS, to provide time from independent authority. It gives the possibility to achieve nanosecond synchronization which makes it suitable for measurement and improve system control. We also briefly discuss advantages and disadvantages of proposed techniques which may have an impact on the use and operation of the project.

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Optimalization of the gas distribution system for the MPD-TOF detector module

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The MPD-TOF detector is a gas detector in which an optimized gas distribution system plays a key role. The main task of this system is to ensure an even, laminar flow of the working fluid throughout the detector volume. During the work, various variants of the gas distribution system were prepared inside the MPD-TOF detector module. Next, flow simulations were carried out for each variant using the CFD method. Based on the results obtained, the optimal option was selected.

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Design and heat transfer simulations for the MPD-TOF detector cooling system

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Electronic devices'overheating may cause functioning problems and production of inaccurate data in the experiment's detectors. The aim of the project was to design the most optimal and efficient way of cooling the MPD-TOF detector's module, to ensure the optimal operating condition for the Front End Electronics. The work cosisted of preparing detailed CAD model of the existing module and proposed cooling system, and performing CFD simulations of heat transfer inside the module.

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Cable tester design for NICA-MPD Platform

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Such big experiments as NICA-MPD come along with a lot of multi-device connections. Therefore, the results of research may depend on quality and correct connection of signal cables. In this talk a complete design of cable tester for the NICA-MPD Platform will be shown, including software, electronical, and mechanical aspects of the device. The project layout has been optimized to provide possibility to check and validate the most popular signal cables. The device assembly process has been designed to meet the requirements of application in standard RACK cabinets.