eurizon
European network
for developing new horizons for RIs

EURIZON detector school

N. De Filippis

Politecnico and INFN Bari

on behalf of the WP7 community

February 9-10, 2023

EURIZON Annual meeting 2023

eurizon
European network
for developing new horizons for RIs

Detector School — July, 17–28, 2023

for training young scientists on state-of-the-art particle detection technologies in the fields of particle-, heavy-ion- and neutron-physics

Lectures and hands-on exercises:

- Tracking & Calorimetry
- Particle Identification
- Gaseous & Silicon detectors
- Neutron & Photon detection
- Detector readout & Data acquisition
- Quantum sensing
- Communication in science
- Detector physics in Georgia

Website:
https://indi.to/EURIZONdetschool

E-mail:
EURIZON.detschool@cern.ch

Venue:
KUTAISI INTERNATIONAL UNIVERSITY
Kutaisi, Georgia

International Organizing Committee:
Lucie Linssen, Eva Sicking (CERN); Simon Spannagel (DESY); Francesco Piscitelli (ESS); Jürgen Eschke, Irakli Keshelashvili, Christian J. Schmidt (GSI); Marcello Abbrescia, Nicola De Filippis (INFN-Bari), Gianluigi Cibinetto (INFN-Ferrara), Gianni Bencivenni (INFN-Frascati), Margherita Primavera (INFN-Lecce); Michael Düren, Marc Strickert (JLU Giessen); Mustafa Schmidt (Univ. Wuppertal)

Local Organizing Committee:
Irakli Keshelashvili, David Mchedlishvili, Levan Kankadze, Gvantsa Gabatashvili, Levan Zaalishvili, Levan Kopaliani, David Dvali, Vakhtang Tsagareli

This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 871072
Design: M. Düren, Photos: CERN

CERN · DESY · ESS EUROPEAN SPALLATION SOURCE · FAIR · INFN · JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN · BERGISCHE UNIVERSITÄT WUPPERTAL

eurizon
European network
for developing new horizons for RIs

The EURIZON school on particle detector technologies will take place at **Kutaisi International University (KIU) in Kutaisi, Georgia**, on July 17-28, 2023.

https://www.kiu.edu.ge/eng/home

Full support by the Georgian Minister of Science and Education Prof. Dr. Mikheil Chkhenkeli

Website of the school:
http://indi.to/EURIZONdetschool

The deadline for applications is **March 28, 2023.**

Features of the school:

eurizon
European network
for developing new horizons for RIs

- The EURIZON Detector School focuses on state-of-the-art particle detection technologies in the fields of particle-, heavy-ion- and neutron-physics.

- The main programme of the school comprises
  - morning lectures by world experts in their fields
  - hands-on exercises on various technologies in the afternoons

- Students will also be given opportunity to present their work.
- Social activities are organised during evenings and on the weekend.
- Full funding (including lodging and international travel) can be offered to a limited number of students.

NB: In case safety imperatives will require a relocation of the school, the school will be organised on the same dates at the **University of Wuppertal, Germany**.

eurizon
European network
for developing new horizons for RIs

Lectures topics:

- Calorimetry – E. Sicking, R. Ferrari
- Characterization of detectors – B. Ristic
- Communication in science, presentation skills – D. Barney
- Evolution on working detector systems from R&D to construction, operation and performance – D. Abbaneo
- Gaseous detectors – M. Abbrescia, M. Bianco
- Neutron detectors – B. Guerard
- Non-collider detectors – B. von Krosigk
- Particle identification – M. Schmidt
- Photon detection – S. Gambetta, S. Jakobsen
- Quantum sensing – M. Doser
- Readout- FPGA- trigger- DAQ- synchronization – F. Pastore, S. Lange, J. Hegeman
- Silicon detectors – M. Deveaux, S. Spannagel
- Tracking – J. Baudot

Hands-on exercises:

eurizon
European network
for developing new horizons for RIs

- Drift Tubes characterization – N. De Filippis, M. Primavera, B. D'Anzi
- MPGD lab. - G. Bencivenni, M. Giovannetti, G. Cibinetto, S. Gramigna
- ROOT tutorial - M. Schmidt et al.
- Geant 4 tutorial - M. Schmidt et al.
- Cosmo boxes – M. Schmidt et al.
- SiPM characterization A – M. Schmidt et al.
- SiPM characterization B - L. Linssen, E. Sicking et al.
- Silicon Pixel characterization - L. Linssen, E. Sicking et al.
- Testbeam data analysis with Silicon Pixel - S. Spannagel et al.
- Simulation of silicon pixel detector and spatial resolution - S. Spannagel et al.
- Landau distribution with Silicon Strip - S. Spannagel et al.
- Do It Yourself Particle Detector - O. Keller

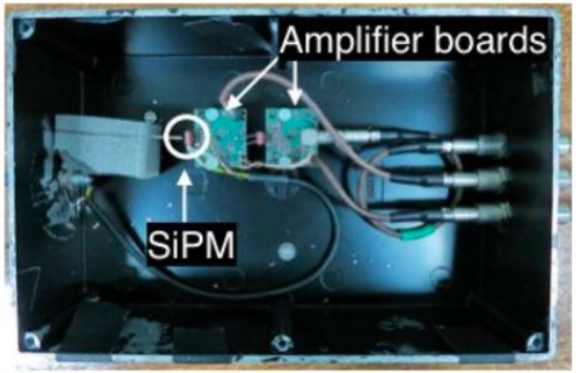
Some info in the next slides

Exercise: SiPM characterization

CERN

Description:

- The students will learn about the basic principles of silicon det. and perform meas. with hybrid pixel-detector assemblies
- the measurement programme includes electrical characterisations, calibration of the energy response using radioactive photon sources, as well as detection of m.i.p from a radioactive electron source (or cosmic rays).

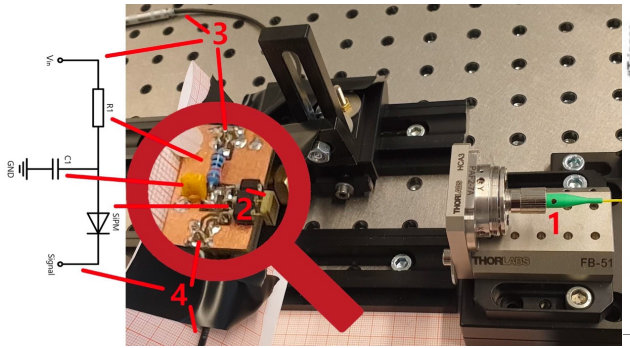


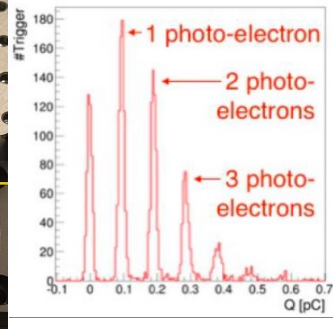
Exercise: SiPM characterization

Wuppertal-Giessen

Description:

- teaching how to perform measurements with SiPMs in combination with a fast oscilloscope
- allows to measure discrete photo-electron spectrum because of the high gain



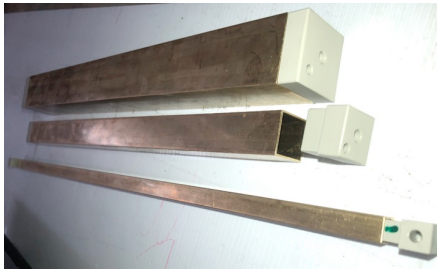


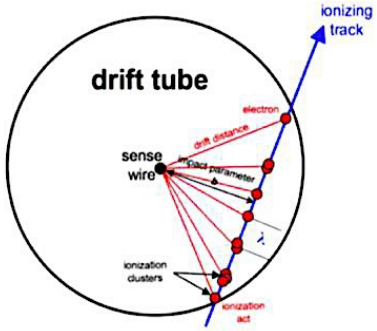
eurizon
European network
for developing new horizons for RIs

Exercise: Characterization of Drift Tubes

INFN Bari and Lecce

Description: characterization of drift tubes with different cell size and different material wires and diameter wires

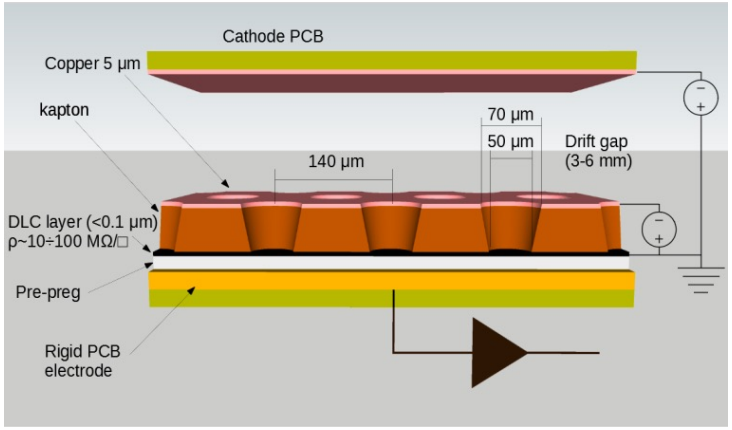




Exercise: MPGD lab

INFN Frascati and Ferrara

Description: the main goal of the MPGD hands on lab is the measurement of the efficiency (+ …) of a μ-RWELL with a cosmic ray telescope. Additional tests can be done with a β source or X source.



eurizon
European network
for developing new horizons for RIs

Exercise: Silicon pixel detector characterization

CERN

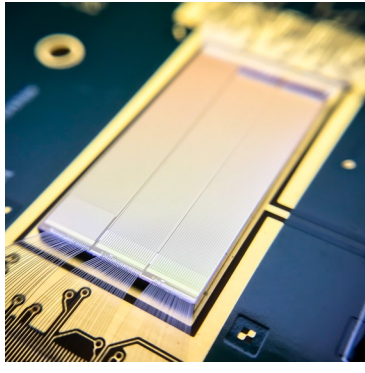
Description: The students will learn about the basic principles of silicon detectors and perform measurements with hybrid pixel-detector assemblies.

Exercise: Testbeam data analysis with Silicon pixel detector characterization. - DESY

Objectives:

- to understand the working principle of silicon pixel detectors
- to analyze a set of test-beam data in order to characterize a pixel sensor prototype and investigate its performance

This is a pure software/analysis lab!

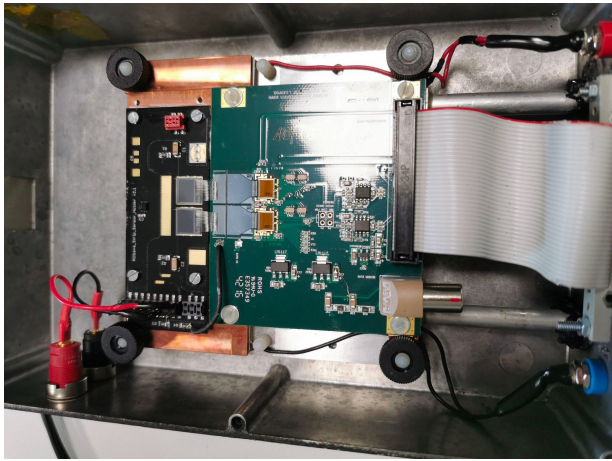


Exercise: Landau distribution with Silicon strip detector - DESY

Objectives:

- Fully integrated table-top experiment with Silicon strip sensor (ATLAS Strip Tracker) with readout chip (Beetle) & DAQ system (Alibava) used to perform calibration measurements (noise, pedestals) with the sensor and do measurements with a radioactive source (e.g. Sr90)

- final goal of the lab: to reconstruct the Landau charge distribution from the data by subtracting pedestals from the data, and by plotting the ADC values obtained



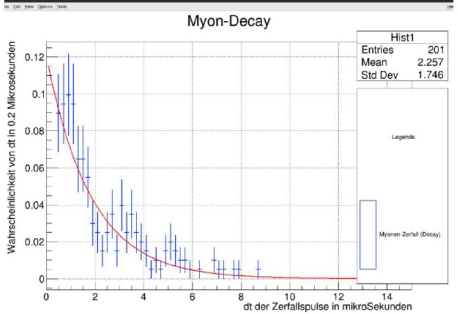
Exercise: Cosmo boxes

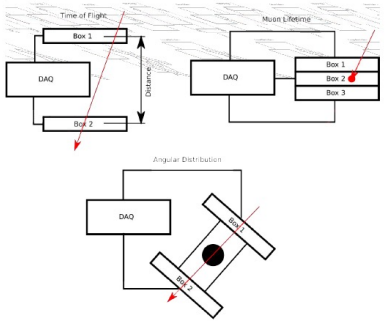
Wuppertal-Giessen

M. Schmidt

Description:

- using setup containing 3 scintillators, readout board and laptop for measuring the properties of cosmic muons





Conclusions:

eurizon
European network
for developing new horizons for RIs

A well organized programme for the Eurizon school includes

- lectures by world experts in their fields
- hands-on exercises on various technologies

Share and subscribe -- the deadline for applications is **March 28, 2023.** The decision about admission will be sent by email by end-April 2023.

Enjoy the school !