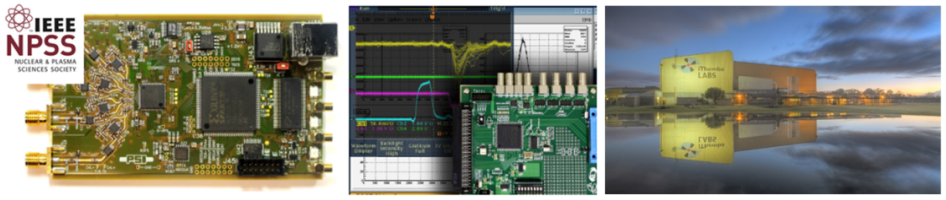
IEEE NPSS International School for Real Time Systems in Particle Physics 2018



Report of Contributions

https://indico.global/e/6797

Contribution ID: **31** Type: **not specified**

Welcome

Saturday 7 July 2018 08:30 (1h 30m)

About the School
Lecturer and Student introduction
Introduction to IEEE NPSS

Contribution ID: **32** Type: **not specified**

Radiation Detectors: past and future

Saturday 7 July 2018 10:30 (1h 30m)

Presenter: LE DÛ, Patrick

Contribution ID: **33** Type: **not specified**

Introduction to photo, gaseous and scintillation detectors

Saturday 7 July 2018 13:00 (1h 30m)

Presenter: LYOUSSI, Abdallah

Contribution ID: **34** Type: **not specified**

Programmable Logics - FPGAs

Saturday 7 July 2018 15:30 (2 hours)

Presenter: NOMACHI, MASAHARU

Contribution ID: **36** Type: **not specified**

FPGA Workshop - Part 1

Sunday 8 July 2018 08:30 (3h 30m)

Presenter: NOMACHI, MASAHARU

Contribution ID: **37** Type: **not specified**

FPGA Workshop - Part 2

Sunday 8 July 2018 13:00 (4h 30m)

Presenter: NOMACHI, MASAHARU

Contribution ID: **38** Type: **not specified**

Introduction to Readout, Trigger and Control Architecture

Monday 9 July 2018 08:30 (45 minutes)

This series of 2 lectures introduces some basic concepts in modern
physics experiment.

The world of frontier physics experiments challenges system design in all its aspects from the definition of the architecture, to data structures and general technology choices, all the way down to the the electronics components. The control and readout are based on very large and complex systems composed of many different technologies which are developed in different environments and cultures. Ultimately, they must meet in a well-integrated system for operational efficiency, and allow maintenance and upgrades over a very
long period of time, often without the original designers. This
translates into a number of considerations and guidelines which should be taken into account from day one in the development of each of the sub-components.

The first part of the lecture gives an introduction to the design of the general architecture of readout, trigger and control systems of the physics experiments, and outlines the definition and functionality of each of the sub-systems. Particular emphasis is put on the functional and environmental criteria which drives the technological choices and the development strategy in view of the long life cycle of the experiments and the many different phases.

In the second part, we will have a look at a number of actual implementations, and examine different choices in electronics, data structures, compression technologies, communication protocols, and how these areas have evolved in the last decade.

Presenter: PURSCHKE, Martin Lothar (Brookhaven National Laboratory (US))

Contribution ID: **39** Type: **not specified**

From Resistor to High Energy Physics Experiments

Monday 9 July 2018 09:15 (45 minutes)

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Presenter: PURSCHKE, Martin Lothar (Brookhaven National Laboratory (US))

Contribution ID: **40** Type: **not specified**

HEP detectors overview and example

Monday 9 July 2018 10:30 (1h 30m)

In order to detect and properly identify particles in High Energy Physics experiments you need to combine results from a combination sub-detectors. There is usually a large number of particles to handle at the same time and many events to study.
I will talk about different types of sub-detectors, how they are combined, different architectures and how this affects the construction of the Data Acquisition Systems. I will start with the basics and then discuss how this is implemented in an actual detector system –the ATLAS detector at CERN.

Presenter: BOHM, Christian (Stockholm University (SE))

Contribution ID: **41** Type: **not specified**

Waveform Digitzing and Signal Processing

Tuesday 10 July 2018 15:00 (1h 30m)

Data acquisition in nuclear and particle physics requires the precise measurement of signal amplitudes and time from detectors. This lecture first gives an overview of traditional methods using signal shaping, various discriminators and analog-to-digital converters (ADC) and time-to-digital converters (TDC). It then moves over to high speed waveform digitizing, a field which recently made tremendous progress due to faster ADCs and so-called switched-capacitor array integrated circuits. These novel devices allow the direct digitisation of detectors with several gigasamples per second (GSPS) and resolutions up to 12 bits. The lecture introduces various signal processing methods to extract the signal amplitude and time from detector signals in the presence of noise.

Presenter: RITT, Stefan (Paul Scherrer Institut (CH))

Contribution ID: **42** Type: **not specified**

Photo, Gaseous and Silicon Detectors

Presenter: DA VIA, Cinzia (University of Manchester (GB))

Contribution ID: **43** Type: **not specified**

Introduction to Networks

Tuesday 10 July 2018 08:30 (45 minutes)

I will give a brief introduction to the basics of the networking setups we will be using during the exercises of the school. I will explain IP address, netmasks and broadcast addresses, gateways, and explain the concepts of networks to the extent that we will need them during the school.

Presenter: PURSCHKE, Martin Lothar (Brookhaven National Laboratory (US))

Contribution ID: **44** Type: **not specified**

Unix Shell Basics

Tuesday 10 July 2018 09:15 (45 minutes)

At the start of the school I will give a very brief introduction to the Unix shell. Most of the exercises during the school will make use of the shell in one way or another, so it is important to be comfortable with it. I will explain why the shell is so powerful, and give some every-day use examples so it is easier for novices to get around on the system.

After discussions with some of you, I have added a small writeup that might explain a few concepts more thoroughly. Download the shell_writeup,pdf file.

Presenter: PURSCHKE, Martin Lothar (Brookhaven National Laboratory (US))

Contribution ID: **45** Type: **not specified**

Real-Time Data Visualization and Control using Modern Web Technologies

Tuesday 10 July 2018 13:00 (1h 30m)

This tutorial teaches modern web technologies for real time visualization and control of processes and experiments. The course starts from basic HTML elements, and then covers modern HTML5 technologies and their usage to display any graphical data. An embedded web server on a Raspberry Pi computer is written from scratch, which can be controlled from any browser using the above technologies to read sensors and switch outputs.

Every attendee is encouraged to bring her/his own laptop to
interactively develop and test all examples. A wireless private network will be available. It is recommended to have a quick look at JSFiddle (https://jsfiddle.net) since this tool will be used throughout the course.

Presenter: RITT, Stefan (Paul Scherrer Institut (CH))

Contribution ID: **46** Type: **not specified**

An Introduction to the RCDAQ Data Acquisition System

Tuesday 10 July 2018 10:30 (1h 30m)

I will give an introduction to the DAQ system which we will use frequently during the school. I will talk about the designs (and some of the design features of a DAQ system in general that I find essential), and teach you about the setup, use, and analysis of the data.

Presenter: PURSCHKE, Martin Lothar (Brookhaven National Laboratory (US))

Contribution ID: **47** Type: **not specified**

Real-Time Data Visualization and Control using Modern Web Technologies - Part 2

Presenter: RITT, Stefan (Paul Scherrer Institut (CH))

Contribution ID: **48** Type: **not specified**

Signal Levels and Bus Standards

Wednesday 11 July 2018 10:30 (1h 30m)

Presenter: LIU, Zhen-An (IHEP,Chinese Academy of Sciences (CN))

Contribution ID: **49** Type: **not specified**

Raspberry Pi

Wednesday 11 July 2018 13:00 (45 minutes)

Based on questions from the students, I will explain a number of sensors that can easily be used with the Raspberry Pi. I will show how to control GPIO pins, connect an infrared sensor, and to connect a DS180B20 temperature sensor.

Presenter: PURSCHKE, Martin Lothar (Brookhaven National Laboratory (US))

Contribution ID: **50** Type: **not specified**

HEP Detectors Overview and Example

In order to detect and properly identify particles in High Energy Physics experiments you need to combine results from a combination sub-detectors. There is usually a large number of particles to handle at the same time and many events to study.
I will talk about different types of sub-detectors, how they are combined, different architectures and how this affects the construction of the Data Acquisition Systems. I will start with the basics and then discuss how this is implemented in an actual detector system –the ATLAS detector at CERN.

Presenter: BOHM, Christian (Stockholm University (SE))

Contribution ID: **51** Type: **not specified**

Tour of iThemba Labs

Monday 16 July 2018 10:30 (1h 30m)

Contribution ID: **52** Type: **not specified**

Introduction to Exercises

Contribution ID: **53** Type: **not specified**

Application of Fundamental Physics in Medicine

Monday 16 July 2018 08:30 (1h 30m)

Imaging, Radiotherapy, …

Details tbd between Patrick, MartinP, MartinG

Presenters: GROSSMANN, Martin (Paul Scherrer Institut); PURSCHKE, Martin Lothar (Brookhaven National Laboratory (US)); LE DÛ, Patrick

Contribution ID: **54** Type: **not specified**

Instrumentation for Harsh and Severe Environments

Monday 9 July 2018 15:00 (1h 15m)

Presenter: LYOUSSI, Abdallah

Contribution ID: **55** Type: **not specified**

Detectors for Safety and Security

Contribution ID: **56** Type: **not specified**

Writing Papers and Preparing Presentations - some Hints

Monday 16 July 2018 13:00 (1h 30m)

Contribution ID: **57** Type: **not specified**

Prepare Presentations

Monday 16 July 2018 15:00 (2 hours)

Contribution ID: **58** Type: **not specified**

Student Presentations - preparation

Tuesday 17 July 2018 08:30 (40 minutes)

Contribution ID: **59** Type: **not specified**

Student Presentations - Part 2

Contribution ID: **60** Type: **not specified**

Collection Questionnaire, Giving out Certificates

Contribution ID: **61** Type: **not specified**

Introduction to TimePix

Tuesday 10 July 2018 16:30 (1 hour)

Author: HOLIK, Michael (CTU Prague / UWB Pilsen)

Presenter: HOLIK, Michael (CTU Prague / UWB Pilsen)

Contribution ID: **62** Type: **not specified**

Application of the TimePix detector

Monday 9 July 2018 16:15 (1h 15m)

Author: STEKL, Ivan

Presenter: STEKL, Ivan

Contribution ID: **63** Type: **not specified**

Introduction to EasyPET exercise

Thursday 12 July 2018 13:00 (1 hour)

Author: GROSSMANN, Martin (Paul Scherrer Institut)

Presenter: GROSSMANN, Martin (Paul Scherrer Institut)

Contribution ID: **64** Type: **not specified**

Women In Engineering (Science, Technology, Physics and Mathematics) Welcome

Wednesday 11 July 2018 15:00 (10 minutes)

Diane Grayson holds a PhD in Physics from the University of Washington and an honorary doctorate in science teacher education from Umeå University in Sweden. She is passionate about helping students succeed through taking a scholarly approach to teaching and curriculum design that promotes effective student learning. She has served on the Council of the South African Institute of Physics, the International Commission on Physics Education and the STEM Committee of the Academy of Science of South Africa. She has worked as an academic and in management at the University of KwaZulu Natal, UNISA, University of Pretoria and the Mathematics, Science and Technology Education College, and also ran her own consultancy, Andromeda Science Education. From 2012-2017 she was a Director at the Council on Higher Education, where she was responsible for the system-wide Quality Enhancement Project, designed to promote student success at all higher education institutions. In 2018 she joined the University of the Witwatersrand as Senior Director: Academic Affairs.

Presenters: DA VIA, Cinzia (University of Manchester (GB)); GLEDHILL, Igle

Session Classification: Women in Engineering Event & Dinner

Contribution ID: **65** Type: **not specified**

Welcome from the School Organisers

Wednesday 11 July 2018 15:10 (10 minutes)

Presenters: MELLADO GARCIA, Bruce (University of the Witwatersrand); BOHM, Christian (Stockholm University (SE)); LE DU, Patrick (IPN Lyon)

Session Classification: Women in Engineering Event & Dinner

Contribution ID: **66** Type: **not specified**

Welcome from the IEEE-NPSS President

Wednesday 11 July 2018 15:20 (10 minutes)

Presenter: RITT, Stefan (Paul Scherrer Institut (CH))

Session Classification: Women in Engineering Event & Dinner

Contribution ID: **67** Type: **not specified**

IEEE-WIE The Cape Town Affinity Group

Wednesday 11 July 2018 16:20 (25 minutes)

Presenter: MWANGAMA, Joyce

Session Classification: Women in Engineering Event & Dinner

Contribution ID: **68** Type: **not specified**

Being the First

Wednesday 11 July 2018 15:55 (25 minutes)

Presenter: BUTHELEZI, Zinhle

Session Classification: Women in Engineering Event & Dinner

Contribution ID: **69** Type: **not specified**

Women in STEM and education

Wednesday 11 July 2018 15:30 (25 minutes)

Presenter: GRAYSON, Diane (University of Witwaterestrand)

Session Classification: Women in Engineering Event & Dinner

Contribution ID: **70** Type: **not specified**

QA Session and Round Table Discussion with the speakers on the theme of "Women in STEM – Networking, Mentoring and Professional Development in South Africa"

Wednesday 11 July 2018 16:45 (1 hour)

Presenter: GRAYSON , Moderated by: Diane

Session Classification: Women in Engineering Event & Dinner

Contribution ID: **71** Type: **not specified**

Silicon Detectors

Monday 9 July 2018 13:00 (1h 30m)

Silicon sensors are extensively used in various applications to image radiation. These applications range from experimental physics at colliders to medicine, biology, environmental monitoring and more. This two-hour lecture will cover several aspect of silicon radiation detectors ranging from fabrication, basic working principle, applications and aspect related to signal formation before and after irradiation. In particular students should expect to learn about:

- Strip and Pixel sensors
- Hybridization
- Basics of Signal formation in silicon
- Basics of radiation effects in silicon devices -
- Examples of applications in High Energy Physics, medicine, environmental monitoring and more
- Novel technologies like micro-fabricated 3D sensors

Presenter: DA VIA, Cinzia (University of Manchester (GB))

Contribution ID: **72** Type: **not specified**

High speed signals, impedances, reflections and grounding

Wednesday 11 July 2018 08:30 (1h 30m)

Presenter: BOHM, Christian (Stockholm University (SE))

Contribution ID: **73** Type: **not specified**

Dispensing certificates - Closing

Tuesday 17 July 2018 11:20 (40 minutes)

Contribution ID: **74** Type: **not specified**

Introduction to photo, gaseous and scintillation detectors - part 2

Saturday 7 July 2018 15:00 (30 minutes)

Presenter: LYOUSSI, Abdallah

Contribution ID: **75** Type: **not specified**

Application of fundamental physics in medicine 1: imaging

Wednesday 11 July 2018 13:45 (45 minutes)

Presenter: PURSCHKE, Martin Lothar (Brookhaven National Laboratory (US))

Contribution ID: **76** Type: **not specified**

4 - Seeing the invisible

Tuesday 17 July 2018 09:48 (12 minutes)

Presenters: INDARJIT, Elisha; MHLANGA, Fortune; TLOU, Humphry; VAN NIEKERK, Karl A.; MASHISHI, Lehumo; CHEMIST, Mabena; MAPHANE, Obakeng

Contribution ID: **77** Type: **not specified**

3 - EasyPET

Tuesday 17 July 2018 09:36 (12 minutes)

Presenters: MIZOKOSHI, Keita (Osaka University); MANTENGU, Nkanyiso (De Beers); BALOYI, Nkateko (Wits University); KHUTSOANE, Oratile

Contribution ID: **78** Type: **not specified**

2-High Voltage Conytrol based on Paspberry Pi

Tuesday 17 July 2018 09:24 (12 minutes)

Presenters: Dr FAMILUA, Amoluloe (University of Johannesburg); MOTAUNG, Gaopalelwe (University of South Africa); LENCWE, Mpho (Tshwane University of Technology); HART, Shanya (University of Witwatersrand); TUKISI, Tlholiso (Vaal University of Technology)

Contribution ID: **79** Type: **not specified**

1-Identifying and Shielding of Ionizing Radiation Using Hybrid Pixel Detector

Tuesday 17 July 2018 09:12 (12 minutes)

Presenters: TEBOGO, Alfred; NKUNA, Bongani; SACKEY, Juliet; MALOMA, Matome; RAPHEEHA, Phuti; MOJAJE, Toka

Contribution ID: **80** Type: **not specified**

5 - Tracking radiation using TimePix

Tuesday 17 July 2018 10:30 (12 minutes)

Presenters: KHOZA, Best (University of Cape Town); BOESAK, Dawid (University of Cape Town); Prof. MOKOENA, Pulane (University ofSouth Africa); MASUKU, Thabo (Wits University)

Contribution ID: **81** Type: **not specified**

6 - EasyPET

Tuesday 17 July 2018 10:42 (12 minutes)

Presenters: PATEL, Amish; NKADIMENG, Edward; MOKGATITSWANE, Gaogalalwe; MASEKANE, Masedi; THABEDE, Mzwandile; MTINTSILANA, Onesimo; THOKOZANE, Sithole

Contribution ID: **82** Type: **not specified**

7 - Radiation Determination using TimePix

Tuesday 17 July 2018 10:54 (12 minutes)

Presenters: KGOGO, Alfred (North Western University); SACKEY, Juliet (University of South Africa); MALOBA, Matome (University of South Africa); RAFEEHA, Phuti (Wits University); MOJAJE, Toka (University of Cape Town)

Contribution ID: **83** Type: **not specified**

8 - Fundamentals of PET Research Using EasyPET

Tuesday 17 July 2018 11:06 (12 minutes)

Presenters: BULALA, Avuyile (University of Cape Town); MOGABE, Hope (North Western University); BALOYI, Nthabiseng (Wits University); TSEHLAHALI, Setelekoane (University of Cape Town); MAGABE, Thabang (Wits University); GAELEJWE, Theodore (Wits University)