# EDIT 2015


# Report of Contributions

https://agenda.infn.it/e/edit2015

Contribution ID: **0** Type: **not specified**

# Dark Matter and Detectors

*Tuesday, 27 October 2015 11:30 (2 hours)*

One of the major challenges of modern physics is to decipher the nature of dark matter. Astrophysical observations provide ample evidence for the existence of an invisible and dominant mass component in the observable universe, from the scales of galaxies up to the largest cosmological scales. The dark matter could be made of new, yet undiscovered elementary particles, with allowed masses and interaction strengths with normal matter spanning an enormous range. Axions, produced non-thermally in the early universe, and weakly interacting massive particles (WIMPs), which froze out of thermal equilibrium with a relic density matching the observations, represent two well-motivated, generic classes of dark matter candidates. Dark matter axions could be detected by exploiting their predicted coupling to two photons, where the highest sensitivity is reached by experiments using a microwave cavity permeated by a strong magnetic field. WIMPs could be directly observed via scatters off atomic nuclei in underground, ultra low-background detectors, or indirectly, via secondary radiation produced when they pair annihilate. They could also be generated at particle colliders such as the LHC, where associated particles produced in the same process are to be detected. After a brief motivation and an introduction to the phenomenology of particle dark matter detection, I will discuss the most promising experimental techniques to search for WIMPs, addressing their current and future science reach, as well as their complementarity.

**Primary author:** Prof. BAUDIS, Laura (University of Zurich)

**Presenter:** Prof. BAUDIS, Laura (University of Zurich)

Contribution ID: **1** Type: **not specified**

# Synchrotron Radiation

*Tuesday, 27 October 2015 09:00 (2 hours)*

Synchrotron radiation is emitted by charged high energy particles, when submitted to transversal acceleration. In particle accelerators it influences beam dynamics, provides an excellent tool for beam diagnostics and specially is a powerful instrument for investigating matter properties in synchrotron light sources. It extends from infrared to X-rays of energies above 100 keV. The excellent energy definition, together with the high fluxes, the properties of spatial and temporal coherence, the variable polarization, opens the utilization of the photon sources to multiple applications. Among the users of the synchrotron light infrastructures stand communities of life science, pharmacology, materials science, cultural heritage, environment, production and conservation of energy.
A constant evolution of the photon sources, of the detection techniques and of the analysis of the light interaction with materials, puts this area at the frontier of knowledge.
Basic features of the radiation will be illustrated, together with a description of the synchrotron light source applications and future trends.

**Primary author:** Dr BISCARI, Caterina (ALBA-CELLS)

**Presenter:** Dr BISCARI, Caterina (ALBA-CELLS)

Contribution ID: **2** Type: **not specified**

# High Energy Physics: the future, the challenges

*Tuesday, 20 October 2015 10:00 (1 hour)*

abstract

**Primary author:** MANGANO, michelangelo (cern)

**Presenter:** MANGANO, michelangelo (cern)

Contribution ID: **3** Type: **not specified**

# Particle ID: Cherenkov Imaging Counters in Nuclear and Particle Physics

*Wednesday, 28 October 2015 09:00 (2 hours)*

The basic principles of Particle IDentification (PID) are introduced with emphasis on the role of the Cherenkov counters.

The Cherenkov effect, with reference to those properties which are at the base of the Cherenkov counter concept, is recalled.

The different Cherenkov counter types (threshold, differential, imaging) are illustrated.
The main components of the Cherenkov counters, namely the radiator materials, the photon detectors and the focusing optical systems are discussed in detail.
The three main RICH (Ring Imaging Cherenkov Counter) families, namely RICHes with focalization,
proximity focusing RICHes and DIRCs (Detection of Internally Reflected Cherenkov (Light) ) are illustrated by outstanding examples,
including double-radiator RICHes, RICHes for space-born experiments and the heavy ion identification by RICH techniques.

Recent novel approaches to the Cherenkov imaging technique as the TOP (Time Of Propagation) concept, the focusing DIRC and the use of aerogel radiators with multiple refractive index are illustrated. A comparison of PID performance offered by Cherenkov imaging approaches and time of flight techniques making use of detectors with time resolution below 100 ps is presented.

The conclusive remarks relate PID opportunities by RICHes with physics programmes in nuclear and subnuclear physics.

**Primary author:** DALLA TORRE, Silvia (TS)

**Presenter:** DALLA TORRE, Silvia (TS)

Contribution ID: **4** Type: **not specified**

# Electronics and Signal Processing: Front-End Electronics

*Friday, 23 October 2015 09:00 (2 hours)*

The course will describe detector signal amplification and processing in particle physics detectors. Characteristics and performance of charge sensitive preamplifiers, speed and noise performance and pulse shaping for charge measurement. High speed and current sensitive architectures, discrimination and timing accuracy for time measurement.

**Primary author:** Dr DE LA TAILLE, Christophe (OMEGA CNRS/IN2P3 Ecole Polytechnique)

**Presenter:** Dr DE LA TAILLE, Christophe (OMEGA CNRS/IN2P3 Ecole Polytechnique)

Contribution ID: **5** Type: **not specified**

# Laser Ranging Space Characterization: an introduction to Satellite Laser Ranging

*Thursday, 22 October 2015 10:00 (1 hour)*

In Satellite Laser Ranging (SLR), a short laser pulse is transmitted from a ground station to an orbiting satellite and reflected back to the station, which measures the roundtrip time of flight and hence the station-to-satellite range. The first laser returns from an artificial satellite were recorded by a NASA team at Goddard Space Flight Center on 29 October 1964.The satellite, Beacon Explorer 22B, was equipped with a Laser Retroreflector Array (LRA), designed to return a sufficient number of laser photons to their point of origin. In July 1969, the Apollo 11 astronauts placed the first LRA on the surface of the Moon; the number of lunar LRAs was later increased to 5 by Apollo 14 and 15 and two unmanned Soviet Lunakhod missions. Over the intervening decades, the ranging precision has improved from a few meters to a few mm and the number of stations in the global network has increased to about 40. Today, the International Laser Ranging Service (ILRS), formed in 1998, coordinates the tracking operations and data analysis activities of approximately 30 participating countries. SLR is one of four techniques currently in wide use by the space geodetic community; the others are Very Long Baseline Interferometry (VLBI), Global Navigation Satellite Systems (e.g. GPS) , and Doppler Orbitography and Radiopositioning by Satellite (DORIS).

Since the Millennium, a few SLR stations have developed the ability to track satellites in daylight using low energy kHz lasers and single photon returns. This demonstrated capability to extract very low level signals from the solar background has opened the door to precise interplanetary ranging and time transfer through the use of laser transponders, with the promise of further contributions to lunar and solar system science, more precise relativity experiments, and improved lunar and planetary mission operations. A second spinoff of single photon SLR technology has been the development of airborne and spaceborne single photon laser altimeters and 3D imaging lidars, which have demonstrated unprecedented surface measurement rates up to 3.2 million pixels per second.

**Primary author:** Dr DEGNAN, John J. (Sigma Space Corporation)

**Presenter:** Dr DEGNAN, John J. (Sigma Space Corporation)

Contribution ID: **6** Type: **not specified**

# Laser Ranging Space Characterization: contributions of Satellite Laser Ranging (SLR) to modern science

*Friday, 23 October 2015 12:30 (1 hour)*

SLR currently defines the Earth Scale Factor (GM) and the origin of the International Terrestrial Reference Frame (ITRF), i.e. the Earth's center of mass. Following the launch of the first geodetic satellites in the 1970s, SLR contributed heavily to our early modeling of the Earth's gravity field, global tectonic plate motion, and regional crustal deformation near plate boundaries. Between VLBI sessions, SLR was also used to interpolate measurements of the Earth Orientation Parameters (EOP), which define the spin axis of the Earth and its time-dependent orientation and speed of rotation within the Celestial Reference Frame. More recently, SLR has been used to transfer time between atomic clocks, located on different continents, at the 50 picosecond level .

The Precise Orbit Determination (POD) capability of SLR has also supported a diverse array of Global Navigation Satellite Systems (GNSS), such as GPS, and international remote sensing satellites. For example, the combination of SLR with spaceborne microwave altimetry has provided spatially resolved maps of: global ocean currents and their velocities, mean sea level (MSL) rise, and even deep sea floor topography. With the advent of spaceborne laser altimeters, which derive much of their technology from the SLR program, high resolution topographic maps of the Earth, Moon, Mars, Mercury, and several asteroids have been obtained. In parallel, Lunar Laser Ranging has made important contributions to Lunar Physics, the Solar System Reference Frame, and General Relativity/Fundamental Physics.

**Primary author:** Dr DEGNAN, John J. (Sigma Space Corporation)

**Presenter:** Dr DEGNAN, John J. (Sigma Space Corporation)

Contribution ID: **7** Type: **not specified**

# Applications to Medicine and Hadrontherapy: Medical Applications of Particle Physics

*Thursday, 29 October 2015 09:00 (2 hours)*

The development of radiation detectors in the field of nuclear and particle physics has had a terrific impact in medical imaging since this latter discipline took off in late ’70 with the invention of the CT scanners. The massive use in Nuclear Physics and High Energy Physics of position sensitive gas detectors, of high Z and high density scintillators coupled to Photomultiplier (PMT) and Position Sensitive Photomultipliers (PSPMT), and of solid state detectors has triggered during the last 30 years a series of novel applications in Medical Imaging with ionizing radiation. The accelerated scientific progression in genetics and molecular biology has finally generated what it is now called Molecular Imaging. This field of research presents additional challenges not only in the technology of radiation detector, but more and more in the ASIC electronics, fast digital readout and parallel software.
In these two lectures I will try to present how Particle Physics and Medical Imaging have both benefited by the cross-fertilization of research activities between the two fields and how much they will take advantage in the future.

## Summary

LECTURE #1 –Physics and Technology
• The physics of CT
• Clinical CT and MicroCT
• The Physics of PET
• The Technology of PET
• Hybrid Systems (PET-CT)
• Molecular Imaging (from man to mouse)
• Preclinical Systems
• Hybrid Systems (PET-MR)

LECTURE #2 –Applications
·Specific applications in clinical PET
·TOFPET
·PET in hadrontherapy
·Organ dedicated PET systems
·A novel technique: Cherenkov Imaging
·Conclusions

**Primary author:** Prof. DEL GUERRA, Alberto (PI)

**Presenter:** Prof. DEL GUERRA, Alberto (PI)

Contribution ID: **8** Type: **not specified**

# LHC Physics and Detectors

*Monday, 26 October 2015 09:00 (2 hours)*

This lecture will give a basic introduction to the physics of the LHC, with focus on the studies of proton-proton collisions, and the corresponding requirements on the detectors. Then the main elements of and the differences among the large LHC experiments will be discussed, and their performance during the first years of LHC running described.

**Primary author:** Prof. DISSERTORI, Günther (ETH Zurich)

**Presenter:** Prof. DISSERTORI, Günther (ETH Zurich)

Contribution ID: **9** Type: **not specified**

# Calorimeters (lecture 1 and lecture 2)

*Tuesday, 20 October 2015 11:30 (1 hour)*

The theoretical lectures on calorimeters will review the principle of Calorimetry and the main techniques used in present and future HEP experiments. A special emphasis will be given to highly granular calorimeters, which are the technology of choice for particle flow applications in HEP, but are also representative of the current R&D in the field of positron emission tomography.

The following points will be addressed in the lectures:
• Signal generating mechanisms
• Signal detection options (with emphasis to the solutions presented in the laboratory courses, i.e. scintillator material coupled to a Si-based photodetector)
• Sampling vs homogeneous calorimeters
• The signal from sampling and longitudinally segmented calorimeters
• Composition of a shower and its space/time evolution
• Linearity and calibration for sampling and longitudinally segmented calorimeters
• e/h and its impact on hadronic energy resolution, response function, signal linearity
• Particle reconstruction and identification in a calorimeter
• The particle flow concept
• Calorimeters for medicine (a glimpse⋯)

**Primary author:** Prof. GARUTTI, Erika (DESY)

**Presenter:** Prof. GARUTTI, Erika (DESY)

Contribution ID: **10** Type: **not specified**

# Heavy Ion Physics: Ultra-relativistic Heavy-Ion Physics and Experiments

In ultra-relativistic collisions of heavy ions at the Large Hadron Collider (LHC) and the Relativistic Heavy Ion Collider (RHIC) large amounts of transverse energy and thousands of particles and anti-particles can be created in a single event and measured by experiments. The system that is created is extremely hot (T ~ 2 x 10^12) at temperatures expected only within the first microseconds after the Big Bang. Normal hadrons cannot exist at these temperatures, which are ~ 200,000 times hotter than the sun's core, and a "soup"of quarks and gluons called the quark-gluon plasma (QGP) is formed. The soup is observed to flow easily, with extremely low viscosity, suggesting a nearly perfect liquid of quarks and gluons. New results from heavy-ion collisions at the LHC have extended the study of the QGP initiated at RHIC to higher temperatures and harder probes. Measurements of very energetic jets, extremely large transverse momentum particles, and heavy flavors indicate a very dense and highly interacting system that is opaque to energetic partons. I will present a motivation for physics in this field, and an overview and interpretation of new results. The RHIC and LHC experiments and their features that allow such measurements will also be presented.

**Primary author:** Prof. HARRIS, John (Yale University)

**Presenter:** Prof. HARRIS, John (Yale University)

Contribution ID: **11** Type: **not specified**

# Lepton and Hadron Colliders

*Wednesday, 21 October 2015 12:30 (1 hour)*

Circular lepton and hadron colliders have been the mainstay of particle and much of nuclear physics research at both the energy and precision frontiers for a few decades. They look set to play this role for a few decades more. This lecture will look at the physics of how they work from the point of view of an experimental physicist (as imagined by an accelerator physicist Ö), working outwards from the collision point. The key differences between lepton and hadron colliders will be explained together with an introduction to key concepts and language from accelerator physics. Some of the physical phenomena limiting the energy and luminosity that can be delivered will be illustrated with examples from the LHC and other colliders.

**Primary author:** ZIMMERMANN, FRANK (CERN)

**Presenter:** ZIMMERMANN, FRANK (CERN)

Contribution ID: **12** Type: **not specified**

# The discovery of Higgs Boson

*Tuesday, 20 October 2015 09:00 (1 hour)*

abstract

**Primary author:** Prof. KADO, Marumi (LAL)

**Presenter:** Prof. KADO, Marumi (LAL)

Contribution ID: **13** Type: **not specified**

# Nuclear Physics: Nuclear Physics in the era of Radioactive Ion Beams

*Friday, 23 October 2015 11:30 (1 hour)*

With the advent of radioactive ion beams, the study of nuclei has received a lot of renewed attention in the past two decades. Several facilities have been built or are being built for the investigation of various characteristics of nuclei under extreme neutron-to-proton ratios. Substantial progress has been made in the last decades in the understanding of stable nuclei and those close to the line of stability. However, the limits of nuclear stability should still be discovered as one moves towards the medium and heavy nuclei, and the underlying forces governing these complicated many-body systems need to be better understood. Some of the nuclear characteristics are well described by the single-particle picture of nuclei and some others by the collective motions of nucleons inside the nuclei. In this lecture, a short overview of some open questions in nuclear physics will be given along with long-range plans of the community on how to move forward.

**Primary author:** Prof. KALANTAR, Nasser (KVI)

**Presenter:** Prof. KALANTAR, Nasser (KVI)

Contribution ID: **14** Type: **not specified**

# Nanotechnologies and new materials

*Wednesday, 28 October 2015 12:30 (1 hour)*

Due to its outstanding electronic, optical, morphological and mechanical properties graphene, a single layer of carbon atoms, can be considered a cutting edge material that is opening up new horizons for the research and development of stable, truly 2D material systems. These shall be intended as materials that do not need to be supported by a substrate to exist and therefore can be isolated as free-standing one atom thick layers. Due to confinement of electrons and to the lack of strong interlayer interactions they usually exhibit optical and electronic properties different from their analogous 3D systems. It is possible to control their transport properties and modify their electronic structure through chemical functionalization. Moreover their mechanical flexibility can be exploited for the integration onto inexpensive platforms.

Graphene has rapidly established itself as a building block for optoelectronic applications in various photodetection platforms, which exploit the lack of a bandgap, the high carrier mobility, the small heat capacitance and resistance and the weak electron-phonon coupling in regimes spanning from UV to the terahertz frequency range. Besides graphene, other types of two-dimensional nanomaterials, such as transition metal dichalcogenides, are attracting the scientific and technological attention due to the inherent functional flexibility of the 2D morphology, which offers size dependent anisotropic properties and opens unprecedented opportunities for the development of atomically thin detectors.

In this lecture, the first part will be dedicated to an overview on graphene and other emerging 2D materials, focusing on their electronic and optical properties relevant for the applications in detectors. Then several detectors architectures based on 2D materials and hybrid systems, made of the combination of different 2D crystals, will be presented to outline the state-of-the-art of the research in this field.

**Primary author:** Dr LARCIPRETE, Rosanna (CNR-ISC/LNF-INFN)

**Presenter:** Dr LARCIPRETE, Rosanna (CNR-ISC/LNF-INFN)

Contribution ID: **15** Type: **not specified**

# Neutrino Physics and Detectors

*Thursday, 22 October 2015 09:00 (1 hour)*

The study of the neutrino is the study of physics beyond the Standard Model. We now know that the neutrinos have mass and that neutrino mixing occurs causing neutrino flavour to oscillate as neutrinos propagate through space and time. Further, some measurements can be interpreted as hints for new particles known as sterile neutrinos. The measured values of the mixing parameters make it possible that the matter-antimatter (CP) symmetry may be violated through the mixing process. The consequences of observing CP-invariance violation in neutrinos would be profound. To discover CP-invariance violation will require measurements of exquisite precision.
After a brief historical introduction I will give an overview of the phenomenology of neutrino oscillations and summarise our present understanding of the phenomenon. The race is on to determine the neutrino mass hierarchy, to find evidence for CP-invariance violation and to understand whether there are undiscovered neutrino species, or forces, beyond those of the Standard Model. I will describe the experimental programme that is underway and that which is planned. To understand the physics that gives rise to the neutrino's unique properties requires measurements of exquisite precision. I will describe the novel detectors that are being developed and the developments in accelerator technique that are required to allow an understanding of the neutrino—and of the physics of flavour—to be developed.

**Primary author:** Prof. LONG, Ken (Imperial College London)

**Presenter:** Prof. LONG, Ken (Imperial College London)

Contribution ID: **16** Type: **not specified**

# Trigger and DAQ: introduction to Data Acquisition

*Wednesday, 21 October 2015 10:00 (1 hour)*

Data Acquisition gets the data from the front-end detector electronics to mass-storage. In this lecture we will cover the most basic concepts of data acquisition and triggering. We will talk about concepts like buffering, dead-time, scalability. We will also introduce some important programming paradigms for DAQ and discuss some aspects of network-ed data acquisition systems.

**Primary author:** Dr NEUFELD, Niko (CERN)

**Presenter:** Dr NEUFELD, Niko (CERN)

Contribution ID: **17** Type: **not specified**

# Trigger and DAQ: introduction to Trigger Systems

*Wednesday, 21 October 2015 11:30 (1 hour)*

This lecture is mainly devoted to introduce the students to the main key concepts one may know to understand how the trigger systems in HEP experiments work.
First we will describe the strong connections with the DAQ and the computing resources of an experiment, motivating the design of a trigger selection and providing the list of design parameters. The students will learn how to ensure good efficiency and effectively measure and monitor it. Many examples will be given, linked to current HEP experiments.
In the second part of the lecture, the students will review different trigger architectures and learn how to build a trigger system and scale it with the increased requirements. We will understand the separation in levels, and the different advantages of synchronous and asynchronous systems. An overview will be given of the helpful technologies, more or less available on the market, together with examples of hardware and software selections of present or future experiments.

**Primary author:** Dr PASTORE, Francesca (CERN)

**Presenter:** Dr PASTORE, Francesca (CERN)

Contribution ID: **18** Type: **not specified**

# Advenced Photosensors

*Wednesday, 28 October 2015 11:30 (1 hour)*

After a short introduction to the technology of Vacuum and Silicon photodetectors, we will talk about some of the latest developments of PMTs, MCP-PMTs and SiPMs with improved characteristics such as the gain, detection efficiency, dark noise, timing resolution, active area.

**Primary author:** Dr PUILL, Véronique (CNRS IN2P3 LAL)

**Presenter:** Dr PUILL, Véronique (CNRS IN2P3 LAL)

Contribution ID: **19** Type: **not specified**

# Novel acceleration techniques for High Brightness Electron Beams

*Thursday, 22 October 2015 12:30 (1 hour)*

abstract

**Primary author:** Prof. ROSENZWEIG, James (UCLA)

**Presenter:** Prof. ROSENZWEIG, James (UCLA)

Contribution ID: **20** Type: **not specified**

# Gas Detectors: detection and localisation of Photons with Gas Devices

*Tuesday, 20 October 2015 12:30 (1 hour)*

Covering the photon wavelength range from infrared to hard X-rays, the lecture will describe the basic processes leading to detection and localisation of single photons, providing selected examples of the gaseous devices developed and used for this purpose.

**Primary author:** Prof. SAULI, Fabio (TERA)

**Presenter:** Prof. SAULI, Fabio (TERA)

Contribution ID: **21** Type: **not specified**

# Gas Detectors: problems and solutions with Gas Detectors

*Wednesday, 21 October 2015 09:00 (1 hour)*

The lecture describes several problems (and some solutions) encountered with the use of gaseous devices in experimental physics and other fields, namely: multi-track separation, rate limitations and discharges, positive ions backflow and track distortions.

**Primary author:** Prof. SAULI, Fabio (TERA)

**Presenter:** Prof. SAULI, Fabio (TERA)

Contribution ID: **22** Type: **not specified**

# Solid State Detectors: Silicon Detectors (lecture 1 and lecture 2)

Silicon micro pattern detectors have paved the way for new possibilities in particle detection by precision measurements of particle tracks close to the interaction point of a collision and thus detecting short lived particles that decay after a length of typically less than a millimeter. The detectors are a text-book example for the interplay between detector, electronics and micro integration developments in recent decades and have profited much from the rapid advances in these fields.
The two lectures will cover the physics of signal generation and processing in patterned semiconductor detectors, most notably micro strip and pixel detectors, but also silicon drift detectors. A focus is placed also on the demands of high rate and radiation environments such as LHC, for which not only new sensor materials such as diamond but also monolithic approaches combining sensor and electronics in one entity are currently developed. Fundamental principles as well as concrete applications will be addressed.

**Primary author:** Prof. WERMES, Norbert (University of Bonn)

**Presenter:** Prof. WERMES, Norbert (University of Bonn)

Contribution ID: **23** Type: **not specified**

# Multi-Grid High-Pressure Gas Proportional Scintillation Counter - A New Approach

In this work a new prototype of HPXe detector for charged particles, hard X-rays and γ-rays is presented. This new detector consists of a high-pressure xenon based proportional scintillation counter (MGHP-GPSC) with a cylindrical geometry. The detection of ionizing radiation in the MGHP-GPSC relies on secondary scintillation as the amplification stage followed by the production of photoelectrons in a photosensitive material, which is in direct contact with the gas. From the point-of-view of the general properties expected, the HPXe-GPSC presents some promising characteristics: energy resolution expected to be close to the intrinsic (0.56% for an incident radiation of 662 keV), since the statistical fluctuations in the number of secondary scintillation photons produced by the drifting electrons in the gas are small, an estimated detector gain of about 21 phe-/(primary e-) will help to attenuate the microphonic effects and since there is no charge gain it will also have negligible space charge effects. In addition, we expect it to be a ruggedized detector since it does not make use of photomultiplier tubes or other photosensors with optical windows.
A general characterization of the detector was carried out using simulation tools as GEANT4 and MATLAB and some of the results are here resumed. When comparing with an earlier version, this detector presents a higher active volume (3369 cm3), improved solid angle (Ω/4π) (0.50-0.85), increased detection efficiency (>25% for 662 keV /15 atm), that will hopefully lead to a better energy resolution.
As a result of the combination of these characteristics, the detector is expected to be very competitive when compared with ionization chambers and proportional ionization counters, especially in more extreme environmental conditions, which may be important for several applications ranging from homeland security to instrumentation for boreholes in geological prospection.

**Primary author:** Mr CORTEZ, André (Laboratório de Instrumentação de Física Experimental de Partículas)

**Co-authors:** Prof. CONDE, Carlos (Universidade de Coimbra); Prof. BORGES, Filipa (Universidade de Coimbra); Dr DO CARMO, Sérgio (Universidade de Coimbra)

**Presenter:** Mr CORTEZ, André (Laboratório de Instrumentação de Física Experimental de Partículas)

Contribution ID: **24** Type: **not specified**

# A Beryllium-emitter based Self Powered Neutron Detector for European ITER Test Blanket Modules

Neutron flux is an important quantity to be measured in the Test Blanket Modules (TBM) of ITER, the experimental nuclear fusion reactor under construction at St. Paul lez Durance in France. Self-Powered Neutron Detectors (SPND) are commonly used for neutron flux monitoring in fission reactors as they are easier to manufacture, use and maintain than many other kinds of nuclear detector. Commercially-available SPNDs are tailored to measure the thermal neutron flux, however in the ITER TBM, the fast neutron flux must also be measured up to energies of the D-T fusion neutrons. An SPND with Beryllium as the emitter material is under design, for application in European ITER TBM.

This work focuses on selection and testing of newer materials for wide neutron spectrum and newer geometrical designs which can be suitably fitted into smaller spaces for instrumentation in the TBM systems of ITER.

Beryllium was identified as a candidate for the emitter material of an SPND to detect fast neutrons, like those expected in HCLL TBM of ITER. Alumina was chosen for insulator and Niobium for the collector material. For first test, thin foils of these materials are stacked to assemble a sandwich-like SPND. The assembly is irradiated with the 14 MeV neutron generator of Technical University of Dresden (TUD-NG) and high-resolution picoammeter is used to measure small electric currents generated in the detector.

A two-step Monte-Carlo simulation regime based on MCNP5 is devised to transport first neutrons and then electrons in the model of the SPND and estimate the electric current. Experimental tests are underway to check the response of the detector in mixed neutron-gamma field. Individual contributions from neutrons and gammas need to be carefully estimated and tested experimentally.

**Primary author:** Mr RAJ, Prasoon (Karlsruhe Institute for Technology)

**Co-author:** Dr KLIX, Axel (Karlsruhe Institute for Technology)

**Presenter:** Mr RAJ, Prasoon (Karlsruhe Institute for Technology)

Contribution ID: **25** Type: **not specified**

# Neutrino experiments at LNGS

*Saturday, 24 October 2015 11:45 (30 minutes)*

The study of neutrino properties is one of the main topics of the researches carried out at the LNGS. Borexino, OPERA and ICARUS experiments significantly contributed to the study of neutrinos exploiting different sources both natural or artificial. Beyond the standard model several anomalies could be interpreted as an indication of existence of sterile neutrino oscillations. In this talk an overview about present and future LNGS experimental activities, will be presented. An outlook of the world wide facilities will be introduced.

**Primary author:** Mrs KOCHANEK, Izabela Anna (LNGS)

**Presenter:** Mrs KOCHANEK, Izabela Anna (LNGS)

Contribution ID: **26** Type: **not specified**

# Neutrinoless double beta decay searches at the Gran Sasso National Laboratory

*Saturday, 24 October 2015 12:15 (30 minutes)*

One of the fundamental open questions in elementary particle physics is the value of the neutrino mass and its nature of Dirac or Majorana particle.
Neutrinoless double beta decay is a key tool for investigating these neutrino properties and for finding answers to the open questions concerning mass hierarchy and mass scale ordering.
In this contribution, an overview of the different experimental approaches to search for neutrinoless double beta decay will be given. Particular attention will be devoted to the current experiments that are being operated or under construction at the Gran Sasso National Laboratory.
The next generation experiments, which aim to further improve the sensitivity on the neutrinoless double beta decay half life, will be also presented

**Primary author:** CANONICA, Lucia (LNGS)

**Presenter:** CANONICA, Lucia (LNGS)

Contribution ID: **27** Type: **not specified**

# Direct search for dark matter at Gran Sasso National Laboratories

*Saturday, 24 October 2015 12:45 (30 minutes)*

Astronomical and cosmological observations indicate that a large amount of the energy content of the Universe is made of dark matter, whose nature is still unknown. A worldwide experimental effort is ongoing to directly detect the interactions of the particles composing dark matter, so to be able to study their properties. Gran Sasso National Laboratories host a few experiments which make use of different detection techniques in order to search for dark matter particles. A review will be given of the various detectors and of their main results.

**Primary author:** Mr MOLINARIO, Andrea (LNGS)

**Presenter:** Mr MOLINARIO, Andrea (LNGS)

Contribution ID: **28** Type: **not specified**

# Search for displaced Lepton Jets with the ATLAS detector and the Phase-I ATLAS upgrade

This poster shows two different studies regarding the ATLAS detector at LHC and done in the first phd year.

The first one regards the Hidden Valley model, which is a new physics theory beyond the Standard Model that predicts neutral particles with decay final states consisting of collimated jets of light leptons and hadrons (called Lepton Jets). In particular, this search regards Lepton Jets made of light leptons and hadrons in proton-proton collisions at the centre of mass energy of $\sqrt{s}$ = 8 TeV with the ATLAS detector at LHC.

The second one regards the the PhaseI ATLAS upgrade which consists in the upgradeof the Small Wheel in the endcap muon spectrometer at ATLAS. The main focus of the PhaseI ATLAS upgrade is on the Level1 trigger and will be installed very innovative detector: the "Micro Mesh Gaseous structure" (MM), composed by three elements: the drift panel (cathode), the Micromesh and the readout panel. The quality control for these panels consists in mechanical measures (planarity,thickness), electric measure and gas tightness.

**Primary author:** Dr DEL GAUDIO, Michela (università della calabria)

**Presenter:** Dr DEL GAUDIO, Michela (università della calabria)

Contribution ID: **29** Type: **not specified**

# The LHCb Upgrade tracking

The LHCb experiment, the unique installed on the LHC specifically designed for the study of heavy flavor Physics, is planned to be upgraded on 2020 with the aim to collect even larger and pure data samples than what is now possible.
To achieve this goal, the LHCb tracking detectors and strategies will be upgraded, to make it feasible the full-event reconstruction in real time at the LHC bunch crossing rate of 40 MHz, by a purely software trigger.

In the poster, the LHCb Upgrade tracking detectors and strategies will be presented, with emphasis on the reconstruction of track momentum using the SciFi detector.

**Primary author:** PIUCCI, Alessio (Physikalisches Institut Heidelberg)

**Presenter:** PIUCCI, Alessio (Physikalisches Institut Heidelberg)

Contribution ID: **30** Type: **not specified**

# Precision measurement of the carrier drift velocities in <100> silicon

Measurements of the drift velocities of electrons and holes as functions of electric field and temperature in high-purity n- and p-type silicon with <100> crystal orientation are presented. The measurements cover electric field values between 2.4 and 50 kV/cm and temperatures between 233 and 333 K. Two methods have been used for extracting the drift velocities from current transient measurements: A time-of-flight (tof) method and fits of simulated transients to the measured transients, with the parameters describing the field and temperature dependence of the electron and hole mobilities as free parameters. A new mobility parametrization, which also provides a better description of existing data than previous ones, allowed an extension of the classical tof method to the situation of non-uniform fields. For the fit method, the use of the convolution theorem of Fourier transforms enabled us to precisely determine the electronics transfer function of the complete set-up, including the sensor properties. The agreement between the tof and the fit method is about 1 %, which corresponds to a time-of-flight uncertainty of 30 ps for a pad diode of 200 µm thickness at the highest voltages. Combining our results with published data of low-field mobilities, we derive parameterizations of the drift velocities in high-ohmic <100> silicon for electrons and holes for fields between 0 and 50 kV/cm and temperatures between 233 and 333 K.

**Primary author:** Mr SCHARF, Christian (Hamburg University (DE))

**Co-author:** Prof. KLANNER, Robert (University of Hamburg)

**Presenter:** Mr SCHARF, Christian (Hamburg University (DE))

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

# Development of intraoperative β– probes for RGS

Radioguided surgery (RSG) is an established technique within the field of oncology surgery.
In this technique a radio-marked tracer, a substance that is preferentially uptaken by tumour cells, is administered to the patient before the surgical operation. A nuclear probe provides the surgeon a precise information about the distribution of a radioactive labelled structure improving the surgery outcome, minimizing the surgical invasiveness thus maximizing benefit to the patient.

I'm working on an innovation of the radio-guided surgery exploiting beta- emitters.
The characteristics of this radiation allow the possibility of extending the technique even to cases with a large uptake from surrounding healthy organs.

I developed different prototypes of intraoperative probes (handy counter for low energy electrons). All the probes were constituted of a millimetric cylindrical scintillator made of doped para-terphenyl coupled to a light collection device (PMT or SiPM). The readout electronics was portable and customized to match the surgeon needs.
Automated preclinical tests on medical phantoms were used to estimate the detector performances. In this way it was possible to simulate finite size remnants, with activities and topologies close to those expected in clinical cases. Phantoms were also useful to going through different kinds of feedback to evaluate the best assist for the surgeons during the operation.

Simulations finalized to application in cases of brain tumours (meningioma and glioma) and neuroendocrine tumours (liver) showed promising results.

**Primary author:** RUSSOMANDO, Andrea (ROMA1)

**Presenter:** RUSSOMANDO, Andrea (ROMA1)

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

# Muon tomography

Muons are higly penetrating particles, which can travel for several kilometers in rocks. They are produced by the interactios between cosmic ray and the atmosphere. Due to their features they can be used in an imaging method call muon tomography. Muon interactions strongly depend from Z number of the material crossed by comic ray. Therefore, because of this characteristic, different material can be detected.

**Primary author:** Mrs GIROLETTI, Alessia (University of Bristol)

**Presenter:** Mrs GIROLETTI, Alessia (University of Bristol)

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

# In beam studies of the Resistive-Plate WELL gaseous multiplier

We present the results of the first in beam studies of medium size (100 × 100 mm^2) Resistive-Plate WELL (RPWELL): a single-faced THGEM coupled to a copper anode through a resistive layer of high bulk resistivity (~10^9 Ωcm). The 6.2 mm thick configuration (excluding readout electronics) was studied with relativistic muons and pions in CERN-SPS test beam. The signal was read out through 10 × 10 mm^2 square copper pads with an APV25-SRS electronics. The detector was operated in Ne/(5%CH4) gas mixture and reached a detection efficiency of 99% at average pad multiplicity as low as 1.2. Operation at particle fluxes up to ~10^5 Hz/cm2 resulted in 30% gain drop and a 0.8% efficiency drop that could be restored by small increase of the THGEM voltage. The striking feature of this detector is being completely discharge-free (discharge probability < 10−8 in high rate pion beam). These results show that the detector is an excellent choice for applications that require cost-effective solutions for radiation detection at moderate spatial and energy resolutions.

**Primary author:** Mr MOLERI, Luca (Weizmann Institute)

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**Presenter:** Mr MOLERI, Luca (Weizmann Institute)

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

# Light weight radiation sensors

In the last few years light weight radiation sensors became important in several science fields such as: engeneering, natural science and physics. Due to their feasibility they can be used in very different enviroments, also in severe condition. This feature make them really attractive for research purpose and also for the industry.

**Primary author:** Mrs GIROLETTI, Alessia (University of Bristol)

**Presenter:** Mrs GIROLETTI, Alessia (University of Bristol)

Contribution ID: **35** Type: **not specified**

# The VSiPMT Project

The VSiPMT (Vacuum Silicon PhotoMultiplier Tube) is an innovative
design for a revolutionary hybrid photodetector.
The idea, born with the purpose to use a SiPM for large detection volumes,consists in replacing the classical dynode chain with a SiPM. In this configuration, we match the large sensitive area of a photocathode with the performances of the SiPM technology, which therefore acts like an electron detector and so like a current amplifier.
The excellent photon counting capability, fast response, low power consumption and great stability are among the most attractive features of the VSiPMT.
We now present the results of a full characterization of the VSiPMT industrial prototypes with their pro and contra and the preliminary tests we are
performing to progress in the realization of a larger VSiPMT prototype.

**Primary author:** BARBATO, Felicia Carla Tiziana (NA)

**Co-authors:** MOLLO, Carlos Maximiliano (NA); VIVOLO, Daniele (NA); DI CAPUA, Francesco (NA); DE ROSA, Gianfranca (NA); MIGLIOZZI, Pasquale (NA); DE ASMUNDIS, Riccardo (NA); Prof. BARBARINO, giancarlo (INFN-NA); Dr CAMPAJOLA, luigi (università di napoli federico II)

**Presenter:** BARBATO, Felicia Carla Tiziana (NA)

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

# Measurement of lepton universality at the NA62 experiment

Kaon physics has played a key role in the development of the Standard Model. Today, high-precision studies of rare kaon decays are sensitive to new physics processes in a complementary way to the direct searches of LHC.

The NA62 experiment, based at CERN SPS accelerator has been designed to collect a very large sample of K+ decays with a sensitivity to branching fractions smaller than 10^{-10}.
In particular, NA62 will measure the branching fraction of the rare decay K+ -> pi+ nu nu. This branching fraction is predicted precisely by the Standard Model and a significant deviation of the measured value will provide evidence of physics beyond the Standard Model. The measurement of its branching ratio with 10 % accuracy will be reached by collecting 100 signal events in 2 - 3 years of data taking.

Another challenging measurement is the helicity suppressed ratio RK = BR(K+ -> e+ nu (gamma)) / BR(K+ -> mu+ nu (gamma)), which is a sensitive test of lepton universality. The analysis of ~ 150 000 reconstructed K+ -> e+ \nu (\gamma) candidates from a dedicated run in an earlier stage of the experiment in 2007 has led to a measurement : RK = (2.488 +/- 0.010) x 10^{-5}. This value is compatible with the Standard Model but the experimental uncertainty is still an order of magnitude higher than the theoretical uncertainty. With the current run of NA62, this measurement will be improved by a factor 2.

The poster will review the NA62 experimental setup and its physics prospects. Special emphasis will be given to the lepton universality measurement and the preliminary analysis of the 2014-2015 data.

**Primary author:** Mrs MAURICE, Emilie (University of Liverpool)

**Presenter:** Mrs MAURICE, Emilie (University of Liverpool)

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

# A CGEM Inner Tracker for the BESIII experiment

A Cylindrical GEM (CGEM) detector with analog readout is being developed to upgrade the Inner Tracker of the BESIII experiment at IHEP (Beijing, P.R.C.).
In this poster a brief presentation of main features of the new tracker will be provided, with particular attention to the peculiar innovations with respect the state of the art in actual GEM detectors. Details of the construction techniques of the various layers will be shown.
Moreover, preliminary results from a test beam performed at CERN will be presented. The results will be focused on spatial resolution with different configuration of magnetic field, gas and field applied.
The project has been recognised as a Significant Research Project within the Executive Programme for Scientific and Technological Cooperation between Italy and P.R.C. for the years 2013-2015, and more recently has been selected as one of the project funded by the European Commission within the call H2020-MSCA-RISE-2014.

**Primary author:** MEZZADRI, Giulio (FE)

**Presenter:** MEZZADRI, Giulio (FE)

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

# Simulation for an all silicon tracker for CLIC

CLIC is a possible future electron-positron linear collider with center-of-mass energies up to 3 TeV. The prospect of high precision measurements at CLIC imposes challenging specifications for the CLIC detector.
The current CLIC detector concept is based on an all silicon tracker.
In this context a simulation chain has been setup to study the performance of different silicon sensor layouts. This simulation chain includes a charge deposit simulation with GEANT4 and a finite element simulation of the charge drift and signal formation with TCAD. In addition the effect of energy fluctuations and electronic noise on the readout signals are included. The readout signals are further used for position reconstruction, taking into account different readout schemes. Using this framework, the effect of various incident angles of the charged particles with respect to the sensor surface as well as the effect of the magnetic field on the sensor performance have been investigated. The simulation chain is validated with data.
Results from the simulation as well as the validation of the simulation with data are presented.

**Primary author:** RUTH MAGDALENA, Munker

**Presenter:** RUTH MAGDALENA, Munker

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

# Electronics for the Time-of-Flight Systems

A conceptual design of the MultiPurpose Detector (MPD) is proposed for a study of hot and dense baryonic matter in collisions of heavy ions. The MPD experiment is foreseen to be carried out at a future JINR accelerator complex facility for heavy ions –the Nuclotron-based Ion Collider fAcility (NICA).
Ambitious physics goals of MPD require excellent particle identification capability over as large as possible phase space volume. Charged particles in a large momentum range are identified in the MPD by the Time of Flight (TOF) detector. Overall time resolution should be better than 100 ps. For the TOF system of the MPD the Multigap Resistive Plate Chambers (MRPC) with a strip readout are used.
Very important part of the high performance of the TOF system is a readout electronics. For the full exploitation of the excellent timing properties of the Multigap Resistive Plate Chamber, front-end-electronics (FEE) with special characteristics are needed. The signals from the MRPCs must be amplified and discriminated as fast as possible without lossless. A signal is read from two sides of the strip, which makes problems like a compatibility the FEE .
A NINO application-specific integrated circuit (ASIC) has been decided as a base of front-end-electronics. The NINO ASIC developed by the CERN LAA project, which combines a fast amplifier, discriminator and stretcher. FEE board based on the NINO ASIC. Designed in the Laboratory for High Energy Physics (LHEP) for compatibility used in the TOF-MPD MRPC.
According to the results of bench tests preamplifier board showed a stable work and good time resolution >10 ps. Also tested with the detector beam of the Nuclotron and achieved time resolution of the system Electronics with Detector ~ 55 ps.

**Primary author:** Mr BURYAKOV, Mikhail (JINR, LHEP)

**Co-authors:** Mr RUMYANTSEV, Mikhail (Joint Institute for Nuclear Research); Mr VOLGIN, Sergey (JINR, LHEP); Mr BABKIN, Vadim (Joint Institute for Nuclear Research); Dr GOLOVATYUK, Vyacheslav (Joint Institute for Nuclear Research)

**Presenter:** Mr BURYAKOV, Mikhail (JINR, LHEP)

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

# TOFPET2: a high-performance ASIC for time and amplitude measurements of SiPM signals in time-of-flight applications

We present a readout and digitization chip for radiation detectors using modern SiPMs. The input amplifier is an optimized and flexible low impedance current mirror based on a regulated common-gate topology. The proposed circuit uses time-of-flight measurement for Positron Emission Tomography (TOF-PET) medical imaging scanners, where a timing resolution below 100 ps is required, and charge integration for linear energy measurement. The circuit is designed in a CMOS 110 nm technology, with linear response at full scale (1500 pC). Simulation results show that for an impulse charge of 200 (550) fC the circuit has 24 (30) dB SNR, 74 (39) ps r.m.s. time resolution, and 4 (8) mW power consumption. The event rate is 600 kHz per channel, with up to 2 MHz dark counts rejection.

**Primary authors:** Mr DI FRANCESCO, Agostino (LIP Laboratorio de Instrumentacao e Fisica Experimental de Particulas); RIVETTI, Angelo (TO); Prof. VARELA, Joao (LIP Lisbon); Mr SILVA, Jose Carlos (LIP Lisbon); Dr OLIVEIRA, Luis (CTS-UNINOVA, DEE, FCT-UNL, Caparica, Portugal); DA ROCHA ROLO, Manuel Dionisio (TO); Mr BUGALHO, Ricardo (PETsys Electronics)

**Presenter:** Mr DI FRANCESCO, Agostino (LIP Laboratorio de Instrumentacao e Fisica Experimental de Particulas)

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

# DEAP-3600 Acrylic Vessel Construction and Light Guide Bonding

DEAP-3600, comprised of a 1 ton fiducial mass of ultra-pure liquid argon, is designed to achieve world-leading sensitivity for spin-independent dark matter (interactions). In addition to rejection of backgrounds through event-wise pulse shape discrimination, the detector must be constructed with materials that have low natural U and Th concentrations to realize the three years of background-free operation design goal. Acrylic represents an ideal material for fabricating the crucial dark matter detector vessels given its ability to be produced with very low levels of U and Th, its excellent optical properties for transmission of the argon generated scintillation light, and the effective shielding it provides for externally produced neutrons that could mimic the dark matter signal. Discussed here is an overview of creating the full-scale DEAP-3600 cryogenic acrylic vessel. Included in the discussion is primary the bonding process developed to attach optically perfect light guides for the project's photodetectors.

**Primary author:** Mr MCELROY, Thomas (University of Alberta)

**Presenter:** Mr MCELROY, Thomas (University of Alberta)

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

# Direct dark matter search with the DAMIC experiment at SNOLAB

During the last century, several astronomical observations suggested the existence of a new massive matter, called dark matter, as it is not subjected to the electromagnetic interaction. It seems to compose 27% of the universe while the visible matter that forms stars and galaxies occupy only 5% of it. Such huge amount of matter has not yet been detected and the most promising candidate are the so-called Weakly Interacting Massive Particles (WIMP), making its search very challenging. DAMIC (Dark Matter in CCDs) is a direct dark matter search experiment using 1 g fully-depleted thick charge couple devices. It is located 2 km underground at SNOLAB in Canada allowing to reduce considerably the cosmic ray background. Featuring a low electronic readout noise ~ 3 e^-, it reaches unique high sensitivity in the low mass region < 5 GeV. The poster presents the experiment as well as its latest results in the search for dark matter.

**Primary author:** Dr TIOUCHICHINE, Elodie (Centro Atomico Bariloche - CONICET, Argentina)

**Presenter:** Dr TIOUCHICHINE, Elodie (Centro Atomico Bariloche - CONICET, Argentina)

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

# Study on the dosimetry of laser accelerated beams for future clinical applications.

Charged particle acceleration, based on the interaction of ultra-intense and ultra-short laser with solid target, can represent a future alternative to conventional techniques, in many applications, from to nuclear physics to radiobiology.
Nowadays, laser accelerated beam has unique features such as a very high peak current and a rather small transverse and longitudinal emittance, as well as a wide energy and angular distribution, and a poor shot-to-shot reproducibility; this makes the beam not directly suitable for many applications, in particular medical ones.
Extensive studies have been carried out on transport, diagnostic and dosimetry in order to obtain a controlled and reproducible beam.
The detectors dedicated to dosimetry of laser accelerated beams must offer response independent of dose rate and must be suitable to operate with high intense beam pulse and strong electromagnetic noise in order to obtain a precise knowledge of the absolute dose delivered, mandatory for clinical applications.
Many detectors are under investigation: solid state detectors (such as nuclear track detectors, radiochromic films, etc.) and ionimetric detectors (such as Faraday Cups and Ionization Chambers for high dose rate beams).
The nuclear track detectors, CR-39, reveal very high sensitivity and uniformity of response and permit the direct measure of particle fluence independent of the particle dose rate.
Dosimetric tests with CR-39 were performed with laser-driven beam at TARANIS, a laser facility in Belfast, at LULI, a laser facility in France, and at PALS, a laser facility in Prague.
The results obtained at the mentioned facilities will be presented.

**Primary author:** MANNA, Rosanna (LNS)

**Co-authors:** Mr AMICO, ANTONIO GIUSEPPE (Università degli studi di Catania); TRAMONTANA, Antonella (LNS); ROMANO, Francesco (LNS); Dr SCHILLACI, Francesco (LNS); CANDIANO, GIACOMO (LNS); CUTTONE, Giacomo (LNS); Ms PETRINGA, Giada (Università degli studi di Catania); MILLUZZO, Giuliana Giuseppina (LNS); CIRRONE, Giuseppe (LNS); Ms LAROSA, Giuseppina (LNS); Dr PIPEK, Jan (LNS); LEANZA, Renata (LNS); Dr MARCHESE, Valentina Anna (INFN-LNS); Dr SCUDERI, Valentina (LNS)

**Presenter:** MANNA, Rosanna (LNS)

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

# EDIT school 2015 - poster abstract by Elena Donegani

present/past scientific work:
1) ongoing PhD in Physics (University of Hamburg, Germany
2) Master in Physics (University of Insubria, Como, Italy)
3) Internship (Paul Scherrer Institute, Villigen, Switzerland)
4) Bachelor in Physics (University of Insubria, Como, Italy

## Summary

1) Fluences as high as 1.3-5·$10^{16}$/$cm^2$ during 5-10 years operation of HL-LHC
will strongly affect the tracking detectors' performance, e.g. resulting in more leakage current, less CCE, and different electric field. Therefore, it is of paramount importance to simulate and predict the impact of different particles in type, energy and fluence on silicon detectors for the LHC upgrade.
Currently few models exist, which address the bulk damage in silicon sensors with effective parameters representing the defects concentration, energy and cross-section. It is the scope of my PhD work to link these effective parameters to microscopic measurements of defects (such as the TSC method), in order to provide a measurement driven-model for bulk damage in highly irradiated silicon sensors.
2) Nowadays, radiotherapy treatments provide excellent conformal dose distributions, but also a non-negligible risk of secondary malignancies induction, mainly because of the neutron contamination of the primary beam. In the first part of my Master work, I simulated with MCNPX the main components of a 18 MV Varian Clinac to study the production, spatial distribution and energy of neutrons photoproduced by the medical linac. The second part of the thesis deals with the R&D of a compact neutron TOF spectrometer, which consists of BC-454 fibers and a MAPMT. The readout electonics (based on the Multi Anode ReadOut Chip - MAROC3 board) allows to perform neutron TOF measurements in real-time.
The new type of nTOF spectrometer is a suitable candidate for neutron dosimetry, aiming at a quantitative comparison with Monte Carlo methods, which currently represent the only way to calculate the contribution of neutrons to the integral dose of a radiotherapy patient.
3) During the internship at the PSI in the "Target Development Group", I worked out a method to calculate with MCNPX the proton- and neutron-induced damage to the most critical structural components of the MEGAPIE spallation target: the main flow guide tube and the lower liquid metal container, with a special focus on the entrance beam window.
Peak values of 6 dpa were found for the beam window, resulting from a four months long exposure to 575 MeV protons (for a 6.8 Ah overall charge), and spallation neutrons produced in the flowing (lead-bismuth eutectic) LBE.
The feasibility of such an approach was confirmed by the subsequent mechanical and microstructure analysis tests performed during the post-irradiation examination phase.
4) My bachelor thesis was performed within the framework of the INFN PhoNeS project, whose main goal was to develop the first hospital-based neutron source for Boron Neutron Capture Therapy (BNCT) treatments.
The underlying principle was the conversion of photons into neutrons (mainly via the GDR process), by means of a converter+moderator system placed directly in front of a standard accelerator for photon therapy.

Firstly, I performed the Neutron Activation Analysis (NAA) on $^{27}$Al samples, to obtain a 2D profile of the neutron field. The maximum neutron flux was $(3.38 \pm 0.02) \times 10^5$ n/cm$^2$/s$^1$.
Secondly, the neutron beam was exploited to develop a new type of neutron autoradiography: in fact, the $\alpha$-particles resulting from the irradiation of boronated samples with thermal neutrons were detected with a microstrip silicon detector. The system was useful for contributing to the research on new $^{10}$B-carriers for BNCT treatments, and to study the $^{10}$B uptake in biological samples.

**Primary author:** Ms DONEGANI, Elena (University of Hamburg)

**Presenter:** Ms DONEGANI, Elena (University of Hamburg)

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

# Study of time response of various detectors

I present a study of the timing properties of various detectors that has been carried on at Bologna INFN laboratories. In particular I have studied the time resolution of Micro Channel Plates (MCP), Silicon PhotoMultipliers (SiPM) and started the characterization of Ultra Fast Silicon Detectors (UFSD). The measurements have been done in a dedicated cosmic ray test stand. The MCP detectors showed good timing properties. The SiPMs, due to their proprieties (compact form, insensitivity to magnetic fields, low voltage power supplies, low cost...), are promising for various scientific applications, from high-energy physics calorimetry/timing/triggering to medical imaging. For these reasons I performed a detailed study of the timing properties of such devices coupled with a scintillator of small dimension. Various couplings to the scintillator (direct or with fibers) and front-end electronics have been used to finally rich a time resolution of about 80 ps.
I also started a research and development activity on Ultra Fast Silicon Detectors (UFSD), which will be characterized by means of Laser, cosmic rays and beam.
I also report the activity in data analysis for the Time of Flight (TOF) of the ALICE experiment. In particular I present results on corrections for time walk effect on the TOF measurements and preliminary study on timing performances with tracks having signals on adjacent readout-pads.

**Primary author:** CARNESECCHI, Francesca (BO)

**Co-authors:** NOFERINI, Francesco (BO); SCIOLI, Gilda (BO); NANIA, Rosario (BO)

**Presenter:** CARNESECCHI, Francesca (BO)

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

# COMBAT: Development of a Track Reconstruction System

In High Energy Physics (HEP), telescopes are systems built for the test of devices under development in a test-beam environment, where well controlled sources of high momentum particles can be used in conditions similar to those observed in actual experiments. They are usually composed of several planes of detectors providing 2-dimensional position, from which 3- dimensional trajectories can be reconstructed. The COMBAT (Compact Brazilian Telescope) was projected as a lightweight, low-material telescope, composed of 8 pixel silicon planes readout with the Timepix chip. The results presented describe the comissioning and data aquisition of COMBAT with measurements of atmospheric muons and a 180 GeV/c beam of protons and pions in the SPS/CERN testbeam area.

**Primary author:** FRANCO LIMA, Vinicius

**Co-authors:** Dr AKIBA, Kazuyoshi (Universidade Federal do Rio de Janeiro); Dr POLYCARPO, Érica (Universidade Federal do Rio de Janeiro)

**Presenter:** FRANCO LIMA, Vinicius

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

# DAQ of MARTA RPCs

MARTA, which stands for Muon Array with RPCs for Tagging Air showers, uses Resistive Plate Chamber detectors, a well known and establish charge particles detector, to detect the muons that are produced in the cosmic ray air showers.
The front-end electronics and readout of this system is based on the MAROC ASIC, developed by OMEGA. This system presents a hybrid approach since it works in counting mode and is also able to read the charge that the incoming particles deposit in the detector. It is also expected that this system works with the minimum power consumption possible since this system is to be deployed in the field where there are power limitations.
A prototype has been developed and is composed mainly by the ASIC, that will amplify the input signal as well as convert it to digital to then be fed to an FPGA that will perform all the digital electronics and finally a USB port to send the data to a computer.
The integration of the MAROC with the RPCs is not trivial since the ASIC was not created for the type of pulses that are outputted by this detectors. For this reason several test benches were created to assess the performance of this system. This benches go from a simple signal generator to simulate the output of a RPC, and is used mostly to develop firmware and software, to a bench where the detector being tested iis placed in between a RPC telescope and is connected to our DAQ and a another well established DAQ system, in order to compare the performance of the systems, and even a test bench that uses two RPCs and two DAQ prototype working in coincidence mode.
The system is already installed in several places around the globe, from Portugal to Brazil and in the near future will also be installed in the Pierre Auger Observatory in Argentina.
This work will focus on presenting this DAQ system as well as all the tests already performed to ensure that the system is optimized.

**Primary author:** Mr LUZ, Ricardo (LIP)

**Presenter:** Mr LUZ, Ricardo (LIP)

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

# The BDX experiment: dark matter search in a Beam Dump eXperiment

The existence of light dark matter particles, with mass in the MeV-GeV range, is theoretically well motivated and at the same time almost unexplored. Such particles could be charged under a new U(1) interaction mediated by a massive gauge boson A', called heavy or dark photon, proposed in many beyond Standard Model theories. The heavy photon is expected to couple weakly to normal charge by kinetically mixing with the "ordinary"photon and thus it can be produced by electron Bremsstrahlung off heavy nuclear targets.
The Beam Dump eXperiment (BDX) proposes to produce light dark matter particles $\chi$ in an electron beam-dump via the A'decay into a pair of $\chi$ and then to detect the $\chi$ interaction in a downstream calorimeter. The calorimeter will be surrounded by active veto detectors and passive shielding to reduce as much as possible the Standard Model particle background.
BDX will probe a wide unexplored region of dark matter parameter space with the unique feature of being simultaneously sensitive to both $\chi$-proton and $\chi$-electron scattering processes.
In order to quantify the background rejection capability and finalize the experimental setup design a BDX prototype is under construction and a campaign of cosmogenic background measurements will be performed next year at the Laboratory Nazionali del Sud in Catania.

**Primary author:** Dr BONDI, Mariangela (INFN-CT)

**Presenter:** Dr BONDI, Mariangela (INFN-CT)

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

# Characterization of the ATLAS Micromegas quadruplet prototype

A Micromegas quadruplet prototype with an active area of 0.5 m2 that adopts the general design foreseen for the upgrade of the innermost forward muon tracking systems (Small Wheels) of the ATLAS detector was constructed at CERN and represents the first example of a Micromegas quadruplet ever built. Basic performance studies carried out with cosmic rays and under X-ray irradiation are presented.

**Primary author:** SIDIROPOULOU, Ourania (University of Wuerzburg)

**Presenter:** SIDIROPOULOU, Ourania (University of Wuerzburg)

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

# Vacuum Phototriode (VPT) Studies

The poster I will be presenting is based on my research accomplished during the first year of my PhD at Brunel University London. This research involves modelling, characterising and testing Vacuum Photo-triode's (VPT). VPT's are used to convert a light pulse into an electrical signal where the magnitude is proportional to the light's intensity. VPTs are modelled using COMSOL; which is a multi-physic simulation package. Accurate replicas of the VPTs are designed and recreated. This will go onto creating various testing models to test VPTs in various different environments. Alongside this, the quality and degradation effects on actual VPTs being in a 4-T magnetic field are being monitored during a long period which takes place at Brunel University London. This Long term testing on a single VPT is to monitor its behaviour when interacting with high and low frequency LED pulses. This has been running for 7 months and will continue until there is sufficient data to carry out a thorough analysis, with the latest results shown on the accompanying poster.

**Primary author:** Ms ZAHID, Sema (Brunel University)

**Presenter:** Ms ZAHID, Sema (Brunel University)

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

# Radiation Hard Silicon Detector

Silicon detectors are widely used in high energy experiments because of their good resolution and small size. The detectors gives precise measurement of particle's tracks and if placed in a magnetic field the detectors also provide high accuracy momentum measurement. The Planner technology, which was originally developed in the field of microelectronics is widely used for fabrication of semiconductor detectors.
These detectors are placed very close to the interaction point (~2-4cm). In future the high energy experiments are required to operate at high energies and luminosities. The detector designs are not capable to withstand such a high radiation fluences and therefore demands the systematic study of radiation damage of silicon sensors. In the present work, n-type Silicon Pad detectors are fabricated and tested. Although the leakage current is high but showing the desired diode behavior. Results of TCAD simulations for silicon detectors with the guard rings under biasing condition have been presented.

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**Co-author:** Mr JADHAV, Manoj (Indian Insitute of Technology Bombay)

**Presenter:** Ms DHANKHER, Preeti (Indian Institute of Technology Bombay)

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

# An FPGA-based Sampling-ADC Readout for the Crystal Barrel Calorimeter

The CBELSA/TAPS experiment at the electron accelerator ELSA (Bonn) investigates the photoproduction of mesons off protons and neutrons.

Presently the readout of the CsI(Tl)-crystals of the Crystal Barrel calorimeter is being upgraded from a PIN-diode readout to an APD readout to create a fast signal for first-level-triggering.
This will increase the trigger efficiency especially for final states with only neutral particles substantially.

To increase the possible data readout rate, which is currently limited by the digitization stage (LeCroy QDC 1885F) to ca. 2kHz, the implementation of a new Sampling-ADC (SADC) readout is being prepared.

Based on the 64-channel PANDA-SADC, the CB-SADC design was modified and adapted to the needs of the CBELSA/TAPS experiment.
It offers 64 channels in one NIM module, together with modular analog or FPGA-based digital shaping.
The data transfer will be realized by two standard gigabit links.
Using an FPGA together with SADCs provides a multitude of possibilities for online feature extraction, such as the determination of the energy deposited in the crystal, TDC capabilities and pile-up detection and recovery.

Supported by the Deutsche Forschungsgemeinschaft (SFB/TR16).

**Primary author:** Mr MÜLLERS, Johannes (Helmholtz-Institut für Strahlen- und Kernphysik, Bonn)

**Co-author:** Dr MARCINIEWSKI, Pawel (Angströmlaboratoriet, Uppsala)

**Presenter:** Mr MÜLLERS, Johannes (Helmholtz-Institut für Strahlen- und Kernphysik, Bonn)

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

# Charge collection studies of silicon microstrip sensors for the CBM Silicon Tracking System.

The Compressed Baryonic Matter (CBM) experiment will be one of the major scientific pillars of the future Facility for Antiproton and Ion Research (FAIR) in Darmstadt. The goal of the CBM research program is to explore the phase diagram of strongly interacting matter in the region of high net baryon densities and moderate temperatures. The compressed matter will be created by using high-energy nucleus-nucleus collisions.
The Silicon Tracking System (STS) is the central component of the CBM experiment. It serves for track and momentum measurement of all charged particles originating from beam-target interactions. The STS will consist of eight tracking stations employing more than 1200 double-sided silicon microstrip sensors on modular structures such that the readout electronics is kept outside of the physics aperture. A response of the silicon micro-strip sensors to the charged particles will be used for space-point determination and subsequent track reconstruction. The radiation load expected in the CBM experiment may significantly influence this sensor response. Studies of charge collection properties of prototype STS microstrip sensors and tests of their radiation tolerance will be overviewed.

**Primary author:** Ms MOMOT, Ievgeniia (Goethe University Frankfurt, Germany)

**Co-authors:** Dr HEUSER, Johann (GSI, Darmstadt, Germany); Dr TEKLISHYN, Maksym (GSI, Darmstadt, Germany); Dr SINGLA, Minni (GSI, Darmstadt, Germany)

**Presenter:** Ms MOMOT, Ievgeniia (Goethe University Frankfurt, Germany)

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

# A teststation for submodules of the forward endcap of the PANDA electromagnetic calorimeter

The forward endcap of the electromagnetic calorimeter of the PANDA experiment is currently being constructed. Its crystals are grouped into submodules consisting of 16 or 8 crystals each. Before these modules are mounted in the detector careful testing is needed and a pre-calibration will be performed at -25℃, the defined working temperature of the detector.
A teststation has been developed using cosmic particles transversing the PbW04-crystals. Cosmic events are selected by two compact trigger detectors. Each of them contains a 4x4 array of scintillators, which are read out by silicon photomultipliers (SiPMs). The poster presents the setup of the teststation discussing in detail the different electronic components used.

**Primary author:** Mr ROSSBACH, Merlin (HISKP Universität Bonn)

**Co-authors:** Dr SCHMIDT, Christoph (HISKP Universität Bonn); Dr WENDEL, Christoph (HISKP Universität Bonn); Mr KUBE, Matthias (HISKP Universität Bonn); Prof. THOMA, Ulrike (HISKP Universität Bonn)

**Presenter:** Mr ROSSBACH, Merlin (HISKP Universität Bonn)

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

# Novel Silicon Structures

Radiation-hard detectors are needed for the High-Luminosity upgrade for the ATLAS experiment at the Large Hadron Collider at CERN. 3D silicon devices are a technology which may be able to provide the required resolution and durability when exposed to ionising radiation. 3D sensors have electrodes processed inside the silicon bulk rather than being implanted on its surface. This paper will present a comparison of the performances of 3D and planar silicon sensors, both connected to pixel-based TimePix readout chips. The 3D detector was found to have less charge sharing and to operate at a lower bias voltage than the planar detector, due to the smaller electrode separation in the latter.

**Primary authors:** Prof. DA VIA, Cinzia (University of Manchester); Mr DANN, Nick (University of Manchester)

**Presenter:** Mr DANN, Nick (University of Manchester)

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

# Measurement of secondary particle production in view of installation and calibration of a novel ion beam therapy monitoring system: Dose Profiler

Ion beam therapy is beneficial for the oncological patients diagnosed with selected cancer indications. This highly precise radiotherapy technique is particularly sensitive to patient positioning and anatomy variations in comparison with photon therapy, which implies research and development of dose monitoring techniques that enable on-line assessment of beam delivery accuracy. Mostly investigated reconstruction of beta+ emitter distributions with Positron Emission Tomography provides not satisfying results for clinical practice, therefore further possibilities such as prompt gamma and secondary charged particles and/or the information from all the aforementioned are considered as the optimal approach.

This contribution reports on data takings performed at HIT (Heidelberg, Germany) facility in order to measure the secondary particles produced by 12C, 4He and 16O ion beams of therapeutical energy impinging on PMMA phantoms. The emission energy spectra and yields of secondary products, detection efficiency and the geometrical acceptance will be reviewed in order to assess the expected monitoring performances as a function of the dose delivered to the patient. A correlation between the secondary emission regions and Bragg Peak position will be shown. The role of those measurements in view of development of the new dose monitoring approach Dose Profiler will be presented.

**Primary author:** RUCINSKI, Antoni Wojciech (ROMA1)

**Co-authors:** SCIUBBA, Adalberto (ROMA1); SARTI, Alessio (LNF); RUSSOMANDO, Andrea (ROMA1); VOENA, Cecilia (ROMA1); PINCI, Davide (ROMA1); SOLFAROLI CAMILLOCCI, Elena (INFN); DE LUCIA, Erika (LNF); COLLAMATI, FRANCESCO (ROMA1); TRAINI, Giacomo (ROMA1); BATTISTONI, Giuseppe (MI); MATTEI, ILARIA (MI); TOPPI, Marco (LNF); Dr MARAFINI, Michela (Centro Fermi); FACCINI, Riccardo (ROMA1); PARAMATTI, Riccardo (ROMA1); MURARO, Silvia (MI); PATERA, Vincenzo (ROMA1)

**Presenter:** RUCINSKI, Antoni Wojciech (ROMA1)

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

# Realization of an innovative Dose Profiler for range monitoring in particle therapy treatments

Particle Therapy exploits accelerated charged ions, tipically protons or carbon ions, for cancer treatments. This technique allows to achieve better accuracy in dose release and help to spare healty tissues around tumour. To fully profit from the therapy spatial selectiveness, a novel monitoring technique, capable to provide a high precision in-treatment feedback on the dose release position, is required. We propose a novel approch based on detection of secondary charge fragments and prompt photons, correleted to dose release, emitted at large angles with respect to the beam direction. A dedicated detector called "Dose Profiler"is currently under development in the frame of the collaborations of INSIDE (Innovative Solutions for In-beam Dosimetry in hadrontherapy) MIUR project and INFN-RDH experiment. Such a device, that will be tested at CNAO (Centro Nazionale di Adroterapia Oncologica) is composed by a tracker and a calorimeter. Six layers (20 × 20 cm2 ) of square scintillating fibers (0.5 × 0.5 mm2 ) give the information of the direction of the particle, while a matrix of sixteen pixellated LYSO crystals (5 × 5 cm2 ) provides the measurement of energy. Four layers (20 ×20 cm2 ) of plastic scintillator are put between tracker and calorimeter in order to absorb backscattered electrons. The light of the fibers is collected by Silicon PhotoMultipliers (SiPM), while the light of calorimeter by multianode photomultipliers. The mechanical structure of the device has been already realized at SBAI (Sapienza Università di Roma, Italy) department mechanic's workshop. Front-end electronics are composed of 4096 channels, 2304 for tracker, 768 for absorber, 1024 for calorimeter. Read-out is performed by 128 ASICs developed by Politecnico di Bari named BASIC32, trigger system and data acquisition by an interacting system of 21 FPGAs. The full electronics system is currently under development in collaboration with Laboratori nazionali di Frascati of INFN. The first prototype of the two front-end boards, with 192 SiPMs, 6 BASIC32 and 1 FPGA, has been already produced; test of all components is currently in process. The architecture of the readout system of the Dose Profiler will be presented.

**Primary author:** TRAINI, Giacomo (ROMA1)

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**Presenter:** TRAINI, Giacomo (ROMA1)

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

# The LHCb VELO Upgrade at Glasgow

Commencing in 2019, the LHCb detector will undergo a full upgrade from its current design, removing the hardware trigger. This new detector will be read out at the full 40 MHz bunch crossing rate. As a part of this upgrade, the current Vertex Locator (VELO) will be replaced. This work involves co-operation between multiple research groups, each designing components in parallel. The responsibility of the Glasgow group is to design and produce both the high speed data links from the sensors and the opto-electrical power boards which the links connect to. These devices undergo a rigorous testing procedure to quantify signal loss and error rates amongst other parameters.

**Primary author:** DEAN, Cameron

**Presenter:** DEAN, Cameron

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

# Quality Assurance and radiation tolerance tests of double-sided silicon sensors for the CBM Silicon Tracking System

The Silicon Tracking System (STS) is the main tracking detector of the upcoming fixed-target Compressed Baryonic Matter (CBM) experiment at FAIR which aims to explore the phase diagram of strongly interacting matter in the region of high net baryonic densities and moderate temperatures. The STS will be used for the reconstruction of tracks of charged particles and the determination of their momenta. The system comprises 8 tracking stations located between 30 cm and 100 cm downstream of the target. The detector will be equipped with approximately 1200 double-sided silicon microstrip sensors in different sizes. A high level of radiation damage is expected to impact on the sensors. Beyond the maximum exposure with 1×10^14 per cm^2 in 1 MeV neutron equivalent that will be reached after several years of running depending on the physics program, the replacement of the sensors is planned. The Quality Assurance (QA) procedures for the STS sensors will be overviewed highlighting the automated QA testing procedure for single strip defect identification. In addition to this, the radiation tolerance studies performed on STS sensor prototypes will be presented.

**Primary author:** Mr LARIONOV, Pavel (Goethe University, Frankfurt)

**Presenter:** Mr LARIONOV, Pavel (Goethe University, Frankfurt)

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

# Design of full custom Data Transmission Unit and M-LVDS transceiver for the Monolithic Active Pixel Sensor chip for the upgrade of the ALICE Inner Tracking System.

In this work we will present the Data Transmission Unit (DTU) and the M-LVDS transceiver designed for the periphery of the ALICE Inner Tracking System (ITS) front-end chip. Actually, in view of the LHC upgrade, even the inner tracker of ALICE has to be upgraded. The ITS upgrade is one of the major project of the upgrade of the ALICE apparatus planned for 2019-2020. In particular, in order to increase granularity, the ITS will be equipped with 7 layers of monolithic active pixel sensors which will cover 10 m2 with 12.5 Gpixels. In order to deal with the increase of the data volume, the DTU sends data out of the chip at the targeting speeds of 1.2 Gb/s and 400 Mb/s. This serial link consists of a 600 MHz clock multiplier PLL, a serializer which works in Double Data Rate and a pseudo-LVDS driver with pre-emphasis. The PLL has a multiplication factor of 15 that is necessary to obtain a 600 MHz and 200 MHz clock from the 40 MHz input clock. The faster clock is sent to the serializer which provides data output at 600 Mb/s and 200 Mb/s respectively. The pseudo-LVDS driver works at 1.2 Gb/s or 400 Mb/s and it has to drive a full 5.3m or 6.5m differential line. In this respect the pre-emphasis was mandatory to overcome the RC limitations imposed by the line.

The M-LVDS transceiver is used to distribute the 40 MHz clock and for chip-to-chip communication. This unit consists of a tristate LVDS based driver and a LVDS receiver where the former allows for a half-duplex topology in which only one driver can transmit while every receiver in the line is receiving. Even if the driver works at 40 MHz (80 Mb/s), it has to drive a 6.5m differential line at which multiple transceivers are connected. For this reason the driver strength of the M-LVDS driver has to be greater then the one of a LVDS driver.

Those two full custom blocks were designed in the 0.18 um CMOS technology chosen for the R&D of the ITS front-end chip.

**Primary author:** LATTUCA, Alessandra (TO)

**Co-author:** MAZZA, Giovanni (TO)

**Presenter:** LATTUCA, Alessandra (TO)

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

# Field Size Factor test for a Treatment Planning System in Hadrontherapy

Hadrontherapy is a promising approach to tumor treatment which uses ion beams (in particular protons and carbon ions) instead of gamma rays as in standard radiotherapy. The main advantage of this technique is that high energy ions release dose along the longitudinal direction with the tipical Bragg Peak (BP), and this allows to reduce the dose to healty tissues an consequently to concentrate it to the cancer. In this context it is very important to choose the right beam energy, and so the BP position, and direction in order to optimize the rate of dose to tumor over the dose to normal tissues. Treatment Planning Systems (TPS) are softwares that compute the main beam parameters (energy, position, direction, etc.) for optimal dose delivery, taking into account the patient morphology obtained for instance from computed tomography scans. Nowadays commercial TPS used in clinical pratice demand for large computational resources and require significant time for a complete calculation. A faster tool would be important for recalculating the dose delivery plan on the day of the treatment. To solve this problem without compromising the accuracy, a fast Monte Carlo TPS on GPU (Graphics Processing Units) has been developed. To check the numerical implementation of Multiple Coulomb Scattering (MCS) model, and the beam lateral dose profiles, a test called Field Size Factor has been used. The test consists of two different trials, both of them have the same setup: a water phantom with a small cylindrical PTW Markus chamber (0.02 cm^3) placed at variable depths. By studying the current response of the Markus information on the deposited dose can be obtained. By varying the position with respect to the chamber and the number of beams, it is possible to study the lateral dose profile and the contribution due to tails in the MCS distribution.
The experimental tests have been performed at Centro Nazionale di Adroterapia Oncologica (CNAO, Pavia) and then the experimental data have been compared to the simulated dose profiles.
The results of Field Size Factor test for different configurations (beam energy and depth) will be presented.

**Primary author:** SENZACQUA, Martina (ROMA1)

**Co-authors:** Dr SCHIAVI, Angelo Schiavi (SBAI Department, Sapienza University of Rome); BATTISTONI, Giuseppe (MI); PIOLI, Stefano (LNF); Prof. PATERA, vincenzo (Universita' di Roma "La Sapienza" & INFN)

**Presenter:** SENZACQUA, Martina (ROMA1)

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

# Construction technique for the MEG Drift Chambers and its related readout electronics

In the search for the charged lepton flavor violating decay: μ+ ⟶ e+ γ, the MEG experiment, at the Paul Scherrer Institute near Zurich, has published in 2013 the upper limit BR (μ+ ⟶ e+ γ) < 5.7×10−13, 90% CL. Final results, based on the complete data set will be published within 2015.
A substantial further improvement of the MEG results requires an improvement of the detector performances in order to reject the background contributions, which limit the signal sensitivity. An upgrade of the experiment is ongoing, aiming at reaching a sensitivity ~5×10−14. A new positron tracker of the magnetic spectrometer is being built as a single-volume cylindrical drift chamber made of:
• 10 layers of drift cells with anodes at alternating stereo angles of about 8°;
• drift cells with an approximately 7×7 mm2 square shape;
• an ultra-low mass gas mixture with helium and iso-butane in the ratio 85:15;
• total material yielding less than 2×10-3 radiation lengths per positron track;
• 20 μm gold-plated tungsten wires as anodes;
• 40÷50 μm silver-plated aluminum wires as cathodes and guard wires;
• dual readout for longitudinal coordinate estimate.
We present a novel construction technique for the new positron tracker of MEG. It consists of a semi automatic wiring machine with a high degree of control over both wire positioning and mechanical tensioning; a contact-less IR laser soldering tool designed for a feed-through-less wire anchoring system and an automatic handling system for storing and transporting the multi-wire layers, before they are mounted on the drift chamber end-plates.
The tracker must achieve a resolution of 100 μm in the measurement of the impact parameter. To fulfilling this goal, we designed and produced a new eight-channel front-end electronic board with a high speed and low noise.
The new construction technique has been successfully implemented at INFN-Lecce and University of Salento and is currently being used.

**Primary author:** CHIARELLO, Gianluigi (LE)

**Co-authors:** CORVAGLIA, Alessandro (LE); MICCOLI, Alessandro (LE); PEPINO, Aurora (LE); Mr PINTO, Carlo (Università del Salento -iNFN Lecce); CHIRI, Claudio (LE); GRANCAGNOLO, Francesco (LE); Dr TASSIELLI, Giovanni Francesco (LE); PANAREO, Marco (LE); SPEDICATO, Matteo (L); PRIMICERI, Patrizio (LE)

**Presenter:** CHIARELLO, Gianluigi (LE)

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

# Irradiation and Testing of ATLAS Silicon Strip Sensors

Continuing the LHC at its current rate of collisions beyond 2022 will no longer provide the same statistical gain per year as it has so far provided. Instead, the LHC will proceed with plans to upgrade the rate of collisions during a 30-month shutdown starting at the end of 2022 and enter the High Luminosity (HL) LHC phase, with the aim of increasing the annual integrated luminosity by a factor 10 and the peak luminosity by a factor of up to 7.5 . Such a large increase in collision rate will demand more from the two General Purpose Detectors (ATLAS and CMS) than was foreseen in their initial designs. The ATLAS Inner Detector (ID) is ill-equipped to handle the environment at the HL-LHC and will be entirely replaced by an all-silicon Inner Tracker (ITk). Track multiplicities will be so large that the occupancy in the current SCT strips and TRT would be be too high. Therefore, shorter silicon strips will be used, the TRT will be entirely replaced by silicon strips and there will also be an expansion of the coverage of the pixel detector. The design of silicon sensors used in the ID is too susceptible to radiation damage to maintain a high performance for the duration of the HL-LHC and, therefore, have been redesigned with a particular focus on improving their radiation hardness.

The University of Birmingham is amongst a consortium of institutes that characterise prototype silicon strip sensors pre- and post-irradiation using the University of Birmingham Medical Physics cyclotron, to assess the consequences on detector performance after a high dose of proton irradiation equivalent to the expected fluence over the HL-LHC lifetime. The poster will outline the irradiation testing procedure that uses an ALiBaVa (RD50) readout system and include some of the recent results obtained from sensors irradiated at the cyclotron; such as the collected charge, peak signal-voltage scans and cluster widths.

**Primary author:** BROUGHTON, James

**Presenter:** BROUGHTON, James

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

# LHCb VELO Upgrade

During Long Shutdown 2 (LS2) of the LHC, LHCb will undergo a series of upgrades to all of its sub detectors. LHCb aims to run at luminosity 5 times greater than the current luminosity, requiring upgrades to the readout to all of the sub detectors and redesign of all front end electronics. The increased rate means many of the detector components will exposed to much harsher running conditions therefore the new detector components must be radiation hard. This is most critical for the Vertex Locator (VELO) due its proximity to the beam. The upgraded VELO will consist of lightweight pixel hybrid pixel sensors. Silicon sensors will be bump bonded to a custom developed Velopix front end ASICs. Currently silicon sensors of different characteristics are being extensively tested in both a lab and test beam environment to determine which will be used VELO.

**Primary author:** Ms BUCHANAN, Emma (University of Bristol)

**Presenter:** Ms BUCHANAN, Emma (University of Bristol)

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

# Construction and Test of New Precision Drift-Tube Chambers for High Counting Rates

The Monitored Drift Tube (MDT) chambers of the ATLAS muon spectrometer demonstrated that they provide very precise and robust tracking over large areas. Goals of ATLAS muon detector upgrades are to increase the acceptance for precision muon momentum measurement and triggering and to improve the rate capability of the muon chambers in the high-background regions when the LHC luminosity increases. Small-diameter Muon Drift Tube (sMDT) chambers have been developed for these purposes. With half the drift-tube diameter of the MDT chambers and otherwise unchanged operating parameters, sMDT chambers share the advantages with the MDT chambers, but have an order of magnitude higher rate capability and can be installed in detector regions where MDT chambers do not fit in. The chamber assembly methods have been optimized for mass production, reducing cost and construction time considerably and improving the sense wire positioning accuracy to better than ten microns. The construction of twelve chambers for the feet regions of the ATLAS detector is currently ongoing with the goal to install them in the winter shutdown 2016/17 of the LHC. Design and construction of the new sMDT chambers for ATLAS will be shown as well as measurements of their precision and performance.

**Primary author:** Mr SCHMIDT-SOMMERFELD, Korbinian (Max-Planck-Institut für Physik)

**Co-authors:** Dr MÜLLER, Felix (Max-Planck-Institut für Physik); Dr KROHA, Hubert (Max-Planck--Institut fuer Physik); Dr KORTNER, Oliver (Max-Planck-Institut für Physik); Mr NOWAK, Sebastian (Max-Planck-Institut for Physics)

**Presenter:** Mr SCHMIDT-SOMMERFELD, Korbinian (Max-Planck-Institut für Physik)

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

# Studies of β-delayed particle emission by means of the Optical Time Projection Chamber

The development of an Optical Time Projection Chamber (OTPC) at the University of Warsaw about a decade ago opened the possibility to investigate a broad range of rare decay modes with very high sensitivity. The detection of one decay event is sufficient to unambiguously identify the decay mode and establish its branching ratio.
The detector is a TPC with amplification stage formed by a stack of GEM foils and optical readout consisting of a CCD camera and a photomultiplier tube (PMT). The images recorded by the CCD camera together with the time distribution of light collected in the PMT allow to reconstruct the trajectory of the decay products [1,2]. Such an approach is ideally suited to study the decay by (multi-) particle emission of very exotic isotopes. It was originally designed to obtain the first unambiguous proof of the two-proton (2p) decay of 45Fe and to study the angular correlations between the protons [3].
The same methodology and detection set-up was successfully applied also to measure the 2p decay of 48Ni [2,4], to discover the beta-delayed 3 proton (β3p) emission decay branch in 45Fe [5], and 43Cr [6] at the NSCL, and in 31Ar at GSI Darmstadt [7,8]. Moreover, it was applied to measure the energy distribution of beta-delayed deuterons from the decay of 6He at ISOLDE [9] and to study the beta-delayed tritium-alpha-neutron decay of 8He at the JINR in Dubna [10]. A review of the results, preliminary results of the β-delayed particle emission from the decay of 27S branch and an outlook on future studies will be presented.

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[9] M. Pfützner et al., Phys. Rev. C 92, 014316 (2015).
[10]. S. Mianowski et al., in preparation.

**Primary author:** Dr KAMINSKI, Grzegorz (Joint Institute for Nuclear Research, Dubna)

**Co-author:** WARSAW DUBNA, OTPC collaboration (Joint Institute for Nuclear Research, Dubna, University of Warsaw)

**Presenter:** Dr KAMINSKI, Grzegorz (Joint Institute for Nuclear Research, Dubna)

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

# Direct Cross Section Measurements for Astrophysics at LUNA

The Laboratory for Underground Nuclear Astrophysics (LUNA) is located at the Gran Sasso National Laboratory (LNGS). The 400kV accelerator for proton or alpha particle beams at LUNA is dedicated to experiments for the direct measurement of cross sections that are relevant for astrophysics. These cross sections are typically small in the energy region of interest (indicated by the Gamow peak), so that LUNA benefits in particular from the low cosmic ray background underground at LNGS but also makes use of further means of background reduction.
The poster presents the LUNA facility and the applied experimental techniques, with a focus on the currently ongoing work.

**Primary author:** BOELTZIG, Axel (GSSI)

**Presenter:** BOELTZIG, Axel (GSSI)

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

# Characterization of the TimePix3 readout chip and radiation-hard sensors for the VELO upgrade

The LHCb experiment located at CERN, Switzerland, studied the difference between matter and antimatter, successfully acquiring data since 2009. The experiment will undergo an upgrade on its detectors to allow operation with higher luminosity, increasing the data acquired by about 10 times. Prototypes for the new detectors were studied for the vertex detector (VELO) detector upgrade. Different types of sensors were tested and characterized to determine whether they satisfy the requirements of the upgrade. The, relatively new, TimePix3 readout chip, which is a prototype for future VELO read-out chip, called VELOPix, was used for the tests of the sensors. The analysis of the most important characteristics of TimePix3, relative to VELOPix, and the tests of the sensors are presented. Also, a comparison between different methods of calibration is performed for the proposed TimePix3. The results obtained shows that some of the prototypes meet successfully the critical requirements (radiation resistance and tolerance to high voltage) of the upgrade.

**Primary author:** Mr VICENTE BARRETO PINTO, Mateus (UNIGe)

**Presenter:** Mr VICENTE BARRETO PINTO, Mateus (UNIGe)

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

# Safety training

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

# Calorimeters

*Thursday, 22 October 2015 11:30 (1 hour)*

**Presenter:** GARUTTI, Erika (DESY)

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

# Welcome

*Saturday, 24 October 2015 11:30 (15 minutes)*

**Presenters:** Dr FORMICOLA, Alba (LNGS); RAGAZZI, Stefano (MIB)

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

# Silicon Detectors

*Monday, 26 October 2015 11:30 (2 hours)*

**Presenter:** Prof. WERMES, Norbert (University of Bonn)

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

# Ultra-Relativistic heavy ion physics and detectors

*Thursday, 29 October 2015 11:30 (2 hours)*

In ultra-relativistic collisions of heavy ions at the Large Hadron Collider (LHC) and the Relativistic Heavy Ion Collider (RHIC) large amounts of transverse energy and thousands of particles and anti-particles can be created in a single event and measured by experiments. The system that is created is extremely hot (T ~ 2 x 10^12) at temperatures expected only within the first microseconds after the Big Bang. Normal hadrons cannot exist at these temperatures, which are ~ 200,000 times hotter than the sun's core, and a "soup"of quarks and gluons called the quark-gluon plasma (QGP) is formed. The soup is observed to flow easily, with extremely low viscosity, suggesting a nearly perfect liquid of quarks and gluons. New results from heavy-ion collisions at the LHC have extended the study of the QGP initiated at RHIC to higher temperatures and harder probes. Measurements of very energetic jets, extremely large transverse momentum particles, and heavy flavors indicate a very dense and highly interacting system that is opaque to energetic partons. I will present a motivation for physics in this field, and an overview and interpretation of new results. The RHIC and LHC experiments and their features that allow such measurements will also be presented.

**Presenter:** Prof. HARRIS, John (Yale University)

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

# Analysis of Fermi-Dirac correlations for proton pairs at LHCb experiment

The analysis uses the effect of quantum correlations for pairs of identical particles emitted independently from different points on a surface of a source. For identical bosons, the Bose-Einstein correlations can happen, while for identical fermions Fermi-Dirac correlations are possible. Analysis of those effects can allow for better understanding of the hadronisation process, especially determining the size and shape of hadronisation region.
The aim of this work was conducting feasibility studies of analysis of Fermi-Dirac correlations for pairs of identical protons in proton-proton collisions at LHCb experiment. Effects similar to expected have been observed, but for quantitative result (and fitting to theoretical models) much larger statistics is needed.

**Primary author:** MALECKI, Bartosz

**Presenter:** MALECKI, Bartosz

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

# Accelerator Laboratory 1.1

*Tuesday, 20 October 2015 15:00 (4 hours)*

**Primary author:** GALLO, Alessandro (LNF)

**Co-author:** CHIADRONI, Enrica (LNF)

**Presenters:** GALLO, Alessandro (LNF); CHIADRONI, Enrica (LNF)

**Session Classification:** Laboratory

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

# Detectors for Calorimetry Laboratory 1.1

*Tuesday, 20 October 2015 15:00 (4 hours)*

**Primary author:** MISCETTI, Stefano (LNF)

**Co-author:** SARRA, Ivano (LNF)

**Presenters:** SARRA, Ivano (LNF); MISCETTI, Stefano (LNF)

**Session Classification:** Laboratory

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

# Trigger and Data Acquisition Laboratory 1.1

*Tuesday, 20 October 2015 15:00 (4 hours)*

**Primary author:** MAZZITELLI, Giovanni (LNF)

**Co-author:** PASQUALUCCI, Enrico (ROMA1)

**Presenters:** PASQUALUCCI, Enrico (ROMA1); MAZZITELLI, Giovanni (LNF)

**Session Classification:** Laboratory

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

# Gaseous Detectors Laboratory 1.1

*Tuesday, 20 October 2015 15:00 (4 hours)*

**Primary author:** BENCIVENNI, Giovanni (LNF)

**Presenter:** BENCIVENNI, Giovanni (LNF)

**Session Classification:** Laboratory

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

# Space characterization of satellite laser ranging payloads 1.1

*Tuesday, 20 October 2015 15:00 (4 hours)*

**Primary author:** BONI, Alessandro (LNF)

**Presenter:** BONI, Alessandro (LNF)

**Session Classification:** Laboratory

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

# SiPMs readout and control with FPGA/SoC 1.1

*Tuesday, 20 October 2015 15:00 (4 hours)*

**Primary author:** FELICI, Giulietto (LNF)

**Presenter:** FELICI, Giulietto (LNF)

**Session Classification:** Laboratory

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

# Solid State Detectors Laboratory 1.1

*Tuesday, 20 October 2015 15:00 (4 hours)*

**Primary author:** Dr DI NEZZA, Pasquale (LNF)

**Co-author:** Dr CURCEANU, Catalina Oana (LNF)

**Presenters:** Dr CURCEANU, Catalina Oana (LNF); Dr DI NEZZA, Pasquale (LNF)

**Session Classification:** Laboratory

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

# Synchrotron Radiation Laboratory 1.1

*Tuesday, 20 October 2015 15:00 (4 hours)*

**Primary author:** BALERNA, Antonella (LNF)

**Presenter:** BALERNA, Antonella (LNF)

**Session Classification:** Laboratory

Contribution ID: **84** Type: **not specified**

# Accelerator Laboratory 1.2

*Wednesday, 21 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **85** Type: **not specified**

# Detectors for Calorimetry Laboratory 1.2

*Wednesday, 21 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **86** Type: **not specified**

# Synchrotron Radiation Laboratory 1.2

*Wednesday, 21 October 2015 15:00 (4 hours)*

**Presenter:** BALERNA, Antonella (LNF)

**Session Classification:** Laboratory

Contribution ID: **87** Type: **not specified**

# Trigger and Data Acquisition Laboratory 1.2

*Wednesday, 21 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **88** Type: **not specified**

# Gaseous Detectors Laboratory 1.2

*Wednesday, 21 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **89** Type: **not specified**

# Space characterization of satellite laser ranging payloads 1.2

*Wednesday, 21 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **90** Type: **not specified**

# SiPMs readout and control with FPGA/SoC 1.2

*Wednesday, 21 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **91** Type: **not specified**

# Solid State Detectors Laboratory 1.2

*Wednesday, 21 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **92** Type: **not specified**

# Accelerator Laboratory 1.3

*Thursday, 22 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **93** Type: **not specified**

# Detectors for Calorimetry Laboratory 1.3

*Thursday, 22 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **94** Type: **not specified**

# Trigger and Data Acquisition Laboratory 1.3

*Thursday, 22 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **95** Type: **not specified**

# Gaseous Detectors Laboratory 1.3

*Thursday, 22 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **96** Type: **not specified**

# Space characterization of satellite laser ranging payloads 1.3

*Thursday, 22 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **97** Type: **not specified**

# SiPMs readout and control with FPGA/SoC 1.3

*Thursday, 22 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **98** Type: **not specified**

# Solid State Detectors Laboratory 1.3

*Thursday, 22 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **99** Type: **not specified**

# Synchrotron Radiation Laboratory 1.3

*Thursday, 22 October 2015 15:00 (4 hours)*

**Presenter:** BALERNA, Antonella (LNF)

**Session Classification:** Laboratory

Contribution ID: **100** Type: **not specified**

# Accelerator Laboratory 1.4

*Friday, 23 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **101** Type: **not specified**

# Detectors for Calorimetry Laboratory 1.4

*Friday, 23 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **102** Type: **not specified**

# Trigger and Data Acquisition Laboratory 1.4

*Friday, 23 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **103** Type: **not specified**

# Gaseous Detectors Laboratory 1.4

*Friday, 23 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **104** Type: **not specified**

# Space characterization of satellite laser ranging payloads 1.4

*Friday, 23 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **105** Type: **not specified**

# SiPMs readout and control with FPGA/SoC 1.4

*Friday, 23 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **106** Type: **not specified**

# Solid State Detectors Laboratory 1.4

*Friday, 23 October 2015 15:00 (4 hours)*

**Session Classification:** Laboratory

Contribution ID: **107** Type: **not specified**

# Synchrotron Radiation Laboratory 1.4

*Friday, 23 October 2015 15:00 (4 hours)*

**Presenter:** BALERNA, Antonella (LNF)

**Session Classification:** Laboratory

Contribution ID: **108** Type: **not specified**

# Accelerator Laboratory 2.1

*Monday, 26 October 2015 15:00 (4 hours)*

**Presenters:** GALLO, Alessandro (LNF); CHIADRONI, Enrica (LNF)

**Session Classification:** Laboratory

Contribution ID: **109** Type: **not specified**

# Accelerator Laboratory 2.2

*Tuesday, 27 October 2015 15:00 (4 hours)*

**Presenter:** GALLO, Alessandro (LNF)

**Session Classification:** Laboratory

Contribution ID: **110** Type: **not specified**

# Accelerator Laboratory 2.3

*Wednesday, 28 October 2015 15:00 (4 hours)*

**Presenters:** GALLO, Alessandro (LNF); CHIADRONI, Enrica (LNF)

**Session Classification:** Laboratory

Contribution ID: **111** Type: **not specified**

# Accelerator Laboratory 2.4

*Thursday, 29 October 2015 15:00 (4 hours)*

**Presenters:** GALLO, Alessandro (LNF); CHIADRONI, Enrica (LNF)

**Session Classification:** Laboratory

Contribution ID: **112** Type: **not specified**

# Detectors for Calorimetry Laboratory 2.1

*Monday, 26 October 2015 15:00 (4 hours)*

**Presenters:** SARRA, Ivano (LNF); MISCETTI, Stefano (LNF)

**Session Classification:** Laboratory

Contribution ID: **113** Type: **not specified**

# Detectors for Calorimetry Laboratory 2.2

*Tuesday, 27 October 2015 15:00 (4 hours)*

**Presenters:** SARRA, Ivano (LNF); MISCETTI, Stefano (LNF)

**Session Classification:** Laboratory

Contribution ID: **114** Type: **not specified**

# Detectors for Calorimetry Laboratory 2.3

*Wednesday, 28 October 2015 15:00 (4 hours)*

**Presenters:** SARRA, Ivano (LNF); MISCETTI, Stefano (LNF)

**Session Classification:** Laboratory

Contribution ID: **115** Type: **not specified**

# Detectors for Calorimetry Laboratory 2.4

*Thursday, 29 October 2015 15:00 (4 hours)*

**Presenters:** SARRA, Ivano (LNF); MISCETTI, Stefano (LNF)

**Session Classification:** Laboratory

Contribution ID: **116** Type: **not specified**

# Trigger and Data Acquisition Laboratory 2.1

*Monday, 26 October 2015 15:00 (4 hours)*

**Presenters:** PASQUALUCCI, Enrico (ROMA1); MAZZITELLI, Giovanni (LNF)

**Session Classification:** Laboratory

Contribution ID: **117** Type: **not specified**

# Trigger and Data Acquisition Laboratory 2.3

*Wednesday, 28 October 2015 15:00 (4 hours)*

**Presenters:** PASQUALUCCI, Enrico (ROMA1); MAZZITELLI, Giovanni (LNF)

**Session Classification:** Laboratory

Contribution ID: **118** Type: **not specified**

# Trigger and Data Acquisition Laboratory 2.2

*Tuesday, 27 October 2015 15:00 (4 hours)*

**Presenters:** PASQUALUCCI, Enrico (ROMA1); MAZZITELLI, Giovanni (LNF)

**Session Classification:** Laboratory

Contribution ID: **119** Type: **not specified**

# Trigger and Data Acquisition Laboratory 2.4

*Thursday, 29 October 2015 15:00 (4 hours)*

**Presenters:** PASQUALUCCI, Enrico (ROMA1); MAZZITELLI, Giovanni (LNF)

**Session Classification:** Laboratory

Contribution ID: **120** Type: **not specified**

# Gaseous Detectors Laboratory 2.1

*Monday, 26 October 2015 15:00 (4 hours)*

**Presenter:** BENCIVENNI, Giovanni (LNF)

**Session Classification:** Laboratory

Contribution ID: **121** Type: **not specified**

# Gaseous Detectors Laboratory 2.2

*Tuesday, 27 October 2015 15:00 (4 hours)*

**Presenter:** BENCIVENNI, Giovanni (LNF)

**Session Classification:** Laboratory

Contribution ID: **122** Type: **not specified**

# Gaseous Detectors Laboratory 2.3

*Wednesday, 28 October 2015 15:00 (4 hours)*

**Presenter:** BENCIVENNI, Giovanni (LNF)

**Session Classification:** Laboratory

Contribution ID: **123** Type: **not specified**

# Gaseous Detectors Laboratory 2.4

*Thursday, 29 October 2015 15:00 (4 hours)*

**Presenter:** BENCIVENNI, Giovanni (LNF)

**Session Classification:** Laboratory

Contribution ID: **124** Type: **not specified**

# Space characterization of satellite laser ranging payloads 2.1

*Monday, 26 October 2015 15:00 (4 hours)*

**Presenter:** BONI, Alessandro (LNF)

**Session Classification:** Laboratory

Contribution ID: **125** Type: **not specified**

# Space characterization of satellite laser ranging payloads 2.2

*Tuesday, 27 October 2015 15:00 (4 hours)*

**Presenter:** BONI, Alessandro (LNF)

**Session Classification:** Laboratory

Contribution ID: **126** Type: **not specified**

# Space characterization of satellite laser ranging payloads 2.3

*Wednesday, 28 October 2015 15:00 (4 hours)*

**Presenter:** BONI, Alessandro (LNF)

**Session Classification:** Laboratory

Contribution ID: **127** Type: **not specified**

# Space characterization of satellite laser ranging payloads 2.4

*Thursday, 29 October 2015 15:00 (4 hours)*

**Presenter:** BONI, Alessandro (LNF)

**Session Classification:** Laboratory

Contribution ID: **128** Type: **not specified**

# SiPMs readout and control with FPGA/SoC 2.1

*Monday, 26 October 2015 15:00 (4 hours)*

**Presenter:** FELICI, Giulietto (LNF)

**Session Classification:** Laboratory

Contribution ID: **129** Type: **not specified**

# SiPMs readout and control with FPGA/SoC 2.2

*Tuesday, 27 October 2015 15:00 (4 hours)*

**Presenter:** FELICI, Giulietto (LNF)

**Session Classification:** Laboratory

Contribution ID: **130** Type: **not specified**

# SiPMs readout and control with FPGA/SoC 2.3

*Wednesday, 28 October 2015 15:00 (4 hours)*

**Presenter:** FELICI, Giulietto (LNF)

**Session Classification:** Laboratory

Contribution ID: **131** Type: **not specified**

# SiPMs readout and control with FPGA/SoC 2.4

*Thursday, 29 October 2015 15:00 (4 hours)*

**Presenter:** FELICI, Giulietto (LNF)

**Session Classification:** Laboratory

Contribution ID: **132** Type: **not specified**

# Solid State Detectors Laboratory 2.1

*Monday, 26 October 2015 15:00 (4 hours)*

**Presenters:** SCORDO, Alessandro (LNF); Dr DI NEZZA, Pasquale (LNF)

**Session Classification:** Laboratory

Contribution ID: **133** Type: **not specified**

# Solid State Detectors Laboratory 2.2

*Tuesday, 27 October 2015 15:00 (4 hours)*

**Presenters:** SCORDO, Alessandro (LNF); Dr DI NEZZA, Pasquale (LNF)

**Session Classification:** Laboratory

Contribution ID: **134** Type: **not specified**

# Solid State Detectors Laboratory 2.3

*Wednesday, 28 October 2015 15:00 (4 hours)*

**Presenters:** SCORDO, Alessandro (LNF); Dr DI NEZZA, Pasquale (LNF)

**Session Classification:** Laboratory

Contribution ID: **135** Type: **not specified**

# Solid State Detectors Laboratory 2.4

*Thursday, 29 October 2015 15:00 (4 hours)*

**Presenters:** SCORDO, Alessandro (LNF); Dr DI NEZZA, Pasquale (LNF)

**Session Classification:** Laboratory

Contribution ID: **136** Type: **not specified**

# Synchrotron Radiation Laboratory 2.1

*Monday, 26 October 2015 15:00 (4 hours)*

**Presenter:** BALERNA, Antonella (LNF)

**Session Classification:** Laboratory

Contribution ID: **137** Type: **not specified**

# Synchrotron Radiation Laboratory 2.2

*Tuesday, 27 October 2015 15:00 (4 hours)*

**Presenter:** BALERNA, Antonella (LNF)

**Session Classification:** Laboratory

Contribution ID: **138** Type: **not specified**

# Synchrotron Radiation Laboratory 2.3

*Wednesday, 28 October 2015 15:00 (4 hours)*

**Presenter:** BALERNA, Antonella (LNF)

**Session Classification:** Laboratory

Contribution ID: **139** Type: **not specified**

# Synchrotron Radiation Laboratory 2.4

*Thursday, 29 October 2015 15:00 (4 hours)*

**Presenter:** BALERNA, Antonella (LNF)

**Session Classification:** Laboratory