Fachverband Strahlen- und Medizinphysik (ST)

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Overview of Invited Talks and Sessions

(Lecture hall H-HS II; Poster Grotte)

Plenary Talk of ST

See PV for details.

PV XII	Thu	9:00– 9:45	H-Aula/HS I/HS X	**Physics-Informed AI for Image Reconstruction in PET** — •Andrew Reader

Invited Talks

ST 4.1	Wed	14:00–14:10	H-HS II	**Der Weg zum Medizinphysikexperten (MPE): Was sind die nötigen Voraussetzungen zur Fachkunde im Strahlenschutz?** — •Markus Buchgeister
ST 4.2	Wed	14:10–14:30	H-HS II	**Vom Physiker zum Medizinphysiker** — •Riccardo Valentini
ST 4.3	Wed	14:30–14:55	H-HS II	**Vom Hochtemperaturplasma zum Innenohr: nur ein Random Walk** — •Josef Seebacher
ST 4.4	Wed	14:55–15:20	H-HS II	**Von der Chaosforschung bis zur Medizintechnik** — •Thorsten Buzug
ST 4.5	Wed	15:20–15:45	H-HS II	**Von der Idee bis zur Auslieferung: Drei Jahre am Siemens Healthineers Standort Kemnath** — •Olivia Stiehl
ST 5.3	Wed	17:30–18:00	H-HS X	**Experimental time resolution limits of modern SiPMs and TOF-PET detectors** — •Stefan Gundacker

Invited talks of the joint symposium SYMD

See SYMD for the full program of the symposium.

SYMD 1.1	Mon	14:30–15:00	H-Aula/HS I/HS X	***N*-Particle Scattering and Asymptotic Completeness in Wedge-Local Quantum Field Theories** — •Maximilian Duell
SYMD 1.2	Mon	15:00–15:30	H-Aula/HS I/HS X	**First observation of double electron capture in Xe-124 with the dark matter detector XENON1T** — •Alexander Fieguth
SYMD 1.3	Mon	15:30–16:00	H-Aula/HS I/HS X	**Anisotropic Transport of Galactic Cosmic Rays based on Stochastic Differential Equations** — •Lukas Merten

Sessions

ST 1.1–1.4	Tue	11:00–12:00	H-HS II	**Radiation monitoring and dosimetry I**
ST 2.1–2.4	Tue	17:00–18:00	Grotte	**Postersession - Medical Physics**
ST 3.1–3.4	Wed	11:00–12:00	H-HS II	**Radiation monitoring and dosimetry II**
ST 4.1–4.6	Wed	14:00–16:00	H-HS II	**DPG trifft DGMP - Berufsperspektiven in der Medizinischen Physik (joint session ST/AKjDPG)**
ST 5.1–5.4	Wed	16:30–18:30	H-HS X	**Combined detector session: EP, HK, ST, T (joint session HK/T/ST/EP)**
ST 6.1–6.4	Thu	11:00–12:00	H-HS II	**Medical Imaging**
ST 7.1–7.6	Thu	14:00–15:30	H-HS II	**Radiation Therapy and Detector Physics**
ST 8	Thu	16:30–17:30	H-HS II	**Annual General Meeting**

Annual General Meeting of the Radiation and Medical Physics Division

Thursday 16:30–17:30 H-HS II

ST 1: Radiation monitoring and dosimetry I

Time: Tuesday 11:00–12:00 Location: H-HS II

ST 1.1 Tue 11:00 H-HS II

Measurement of the radiation quality of a X-ray Source using ATLAS Pixel detectors — •Simon Jansen[1], Kevin Kröninger[1], Isabelle Schilling[1], Jörg Walbersloh[2], and Jens Weingarten[1] — [1]TU Dortmund, Dortmund, Deutschland — [2]Materialprüfungsamt NRW, Dortmund, Deutschland

ISO and DIN standards define various standard X-ray spectra (so-called "qualities") for the purpose of calibrating dosemeters at low photon energies.
To calibrate the X-ray facility at the Materialprüfungsamt NRW in Dortmund and verify the spectra with respect to the ISO and DIN standards, the spectrum of the X-ray facility is measured using an ATLAS Pixel detector while varying the voltage and current of the X-ray tube, as well as material and thickness of a set of absorbers.
With respect to a traditional spectroscopy setup using Germanium detectors the advantage of the proposed setup is that the detector is very mobile and does not need to be cooled, reducing the overhead for a measurement and thus allowing regular recalibrations of the X-ray facility. The talk will introduce the experimental setup and first spectroscopic result.

ST 1.2 Tue 11:15 H-HS II

Studies of emission spectra of various thermoluminescence materials — •Evelin Derugin[1], Florian Mentzel[1], Jens Weingarten[1], Jörg Walbersloh[2], and Kevin Kröninger[1] — [1]TU Dortmund, Lehrstuhl für Experimentelle Physik IV — [2]Materialprüfungsamt NRW

The individual monitoring service at the *Materialprüfungsamt NRW* develops the thermoluminescence(TL) dosemeter system TL-DOS for large scale individual dose monitoring in cooperation with the *Lehrstuhl für Experimentelle Physik IV* at the TU Dortmund University. When a TL material is exposed to ionizing radiation it stores the deposited energy by trapping excited electrons in metastable states. When heated, the material releases the trapped electrons depending on their energy difference to the next band. These electrons can recombine with holes and vice versa, leading to an emission of light. The intensity of the emitted light is proportional to the amount of initially deposited energy.
In the course of the improvement of the readout method in order to optimize TL light sensitive filters, it is important not only to make a statement about the glow curve, but also to consider the emission spectrum of the emitted TL light. In the context of a master thesis different TL materials, which are currently used as detector material are examined for their emission spectra after irradiation. The study provides information about the intensity distribution as a function of the wavelength of the light.
The talk will discuss the different emission spectra of the TL materials.

ST 1.3 Tue 11:30 H-HS II

The prospects of the evaluation of the high-LET peaks of thermoluminescence glowcurves in the context of neutron dosimetry — •Myriam Heiny[1], Ajvar Kern[3], Kevin Kröninger[1], Jörg Walbersloh[2], and Jens Weingarten[1] — [1]TU Dortmund University, Dortmund, Germany — [2]Materialprüfungsamt NRW, Dortmund, Germany — [3]West German Proton Therapy Centre Essen, Essen, Germany

The individual monitoring service at the Materialprüfungsamt Nordrhein-Westfalen and the TU Dortmund are developing the compact dosemeter system TL-DOS based on thin-layer thermoluminescence detectors as well as an associated glow curve analysis tool. This work focuses on the TL-DOS neutron dosemeter system.

The system consists of LiF:Mg,Ti detectors, an albedo badge and a readout device. In order to gain more information about the irradiation like the particle type, the detectors used are measured at 380°C to include the high-LET peaks. The resulting glow curve is deconvoluted into its individual peaks to analyze them. After a design specification was defined, the neutron dosemeter was characterized in different photon and neutron fields as well as in workplace fields. Additionally, the system was irradiated with mixed fields like alpha+photon and neutron+photon fields to analyzed the high LET peaks of a glow curve seperately. The analysis provides additional information about the radiation field, for example the particle type, the composition of mixed fields and the irradiation energy. I present the current development status and test results as well as future prospects.

ST 1.4 Tue 11:45 H-HS II

Co-registration of ionoacoustics and ultrasound signals in a 3D printed realistic mouse phantom. — •Pratik Dash[1], Julie Lascaud[1], Hans-Peter Wieser[1], Ronaldo Kalunga[1], Benjamin Wollant[1], Walter Assmann[1], Jonathan Bortfeldt[1], Alessandro Stuart Savoia[2], and Katia Parodi[1] — [1]Ludwig-Maximilians-Universität München, Garching b. Munich, Germany — [2]Department of Engineering, Roma Tre University, Rome, Italy

Proton therapy, owing to its pronounced maximum dose deposition (Bragg Peak-BP) at the end of its finite range in matter, allows for a highly conformal tumor irradiation. Ionoacoustic range verification uses thermoacoustic waves generated from irradiated regions to derive the BP positions, thereby enabling real-time treatment monitoring.

Superimposing ultrasound images with ionoacoustic signals requires both spatial and temporal co-registration between the two. The former is achieved by using the same transducer whereas the latter is achieved by using a synchronized trigger for data acquisition. Temporal co-registration was validated in simple water phantoms irradiated by a 20 MeV proton beam at the Maier-Leibnitz Laboratory in Munich. A dedicated procedure was then defined to correct for the time offset between the two signals (more specifically, their measurement triggers).

Finally, the effect of tissue heterogeneities in the medium was investigated by irradiating a 3D printed realistic mouse phantom. We demonstrated improved range verification accuracy and precise co-registration between the two modalities, facilitating a superposition of the pressure induced by 3D dose distribution and the mouse anatomy.

ST 2: Postersession - Medical Physics

Time: Tuesday 17:00–18:00 Location: Grotte

ST 2.1 Tue 17:00 Grotte

Photon interaction position determination in monolithic scintillators via Neural Network algorithms — •Maria Kawula[1], Tim Binder[1,2], Silvia Liprandi[1], Katia Parodi[1], and Peter G. Thirolf[1] — [1]Ludwig-Maximilians-Universität München — [2]KETEK GmbH München

Monolithic scintillators are an attractive alternative to pixelated crystals as a part of multiple-component photon detectors like Compton cameras. We propose a novel algorithm for determining the position of γ-ray interactions in a monolithic scintillation crystal, based on Supervised Machine Learning involving Convolutional Neural Networks (CNN). The new method is an alternative to well-established algorithms such as "k-Nearest Neighbours" (kNN), which suffers from long computation time and high memory requirements. Two crystals, $LaBr_3$:Ce and $CeBr_3$, of size 50 mm×50 mm×30 mm were examined. The spatial resolution of the CNN algorithms was tested for three energies of the initial γ quanta: 662 keV (^{137}Cs), 1.17 MeV and 1.33 MeV (^{60}Co). A spatial resolution of the algorithm of 1.04 ($\pm$0.04 stat. $\pm$ 0.2 sys.) mm at 662 keV and 0.90 ($\pm$0.02 stat. $\pm$ 0.2 syst.) mm at 1.3 MeV for $LaBr_3$:Ce and $CeBr_3$, respectively, was achieved. The new reconstruction scheme is compatible with CPUs and GPUs and can reconstruct up to $2 \cdot 10^4$ events/s, which is four orders of magnitude faster than the kNN. Memory requirements are reduced by $\approx$1/1000.
This work was supported by the DFG Cluster of Excellence MAP (Munich Centre for Advanced Photonics) and the Bayerische Forschungsstiftung.

ST 2.2 Tue 17:00 Grotte

Event Processing for the SiFi-CC based on Geant4 Simulations — •Jonas Kasper[1], Achim Stahl[1], Ronja Hetzel[1], Aleksandra Wronska[2], Majid Kazemi-Kozuni[2], Andrzej Magiera[2], and Katarzyna Rusiecka[2] — [1]III. Physikalische Institut B, RWTH Aachen University, Aachen — [2]Institute of Physics, Jagiellonian University, Kraków

In 2014 NuPECC listed online monitoring of the beam range in hadron therapy as one of the most important challenges in hadron therapy. Monitoring systems based on the detection of prompt gamma radiation are considered as one of the most promising options. A Compton Camera, yielding the full three-dimensional dose distribution, is one of the favoured detector setups. Scientist of the Jagiellonian University in Cracow and the RWTH Aachen University in Aachen develop the SiPM and scintillating Fiber-based Compton Camera (SiFi-CC) to detect prompt gamma radiation. The Compton Camera consists of two modules, the scatterer and the absorber. Both modules are built from stacked, heavy, scintillating fibers read out by SiPMs. Different setup approaches for the SiFi-CC are simulated with Geant4. Based on these simulations, an analysis and reconstruction chain is set up. The steps of the data processing are the reconstruction of the interactions in the detector on fiber level, building detector events from these fibers, sorting these events for the picture reconstruction and the reconstruction of the source distribution. The performance of the different steps based on the simulated response of the SiFi-CC to the radiation produced by the interactions of a proton beam in a PMMA phantom are presented.

ST 2.3 Tue 17:00 Grotte

Purification of the organo-metallic liquid TMBi for use in a novel PET detector — •Simon-Nis Peters[1], Konstantin Bolwin[2], Björn Gerke[2], Volker Hannen[1], Christian Huhmann[1], Klaus Schäfers[2], and Christian Weinheimer[1] — [1]Institut für Kern- physik, WWU Münster — [2]European Institute for Molecular Imaging, WWU Münster

Recently, a new type of PET detector has been proposed using a heavy organo-metallic liquid - TriMethyl Bismuth (TMBi) - as target material. TMBi is a transparent liquid 82% by weight of Bismuth as the heaviest non-radioactive element. 511 keV photons from annihilation processes are effectively converted to photo-electrons in the material due to the high Z bismuth component. These photo-electrons produce both Cherenkov light and charges in the liquid. While the optical component enables a fast timing, charge readout using a segmented anode can provide an accurate position reconstruction. To be able to drift the charges to the anode a high level of purification of the liquid is required, removing any electro-negative contaminations. Due to the reactive nature of the liquid, purification using getter materials is not an option. In addition only vacuum grade ceramics and stainless steel components can be used for a purification system. The Poster will present the design of a purification bench combining a TMBi distillation column with molecular sieves and a prototype detector cell which will allow to determine the characteristics of charge readout in the liquid. This work is supported by the DFG (Project number: WE 1843/8-1; SCHA 1447/3-1)

ST 2.4 Tue 17:00 Grotte

Design of a detector cell for charge-readout tests in TMBi — •N. Marquardt[1], K. Bolwin[2], B. Gerke[2], V. Hannen[1], C. Huhmann[1], S. Peters[1], K. Schäfers[2], and C. Weinheimer[1] — [1]Institut für Kernphysik, WWU Münster — [2]European Institute for Molecular Imaging, WWU Münster

The heavy organo-metallic liquid TriMethyl Bismuth (TMBi) has been proposed as a medium for a new type of PET detector. TMBi is a transparent liquid with a Bismuth mass fraction of 82%. Due to the high Z component of Bismuth, the 511 keV photons produced in annihilation processes are effectively converted to photo-electrons in the liquid. These photo-electrons produce both Cherenkov light and charge carriers in the TMBi. The detection of the Cherenkov light allows a fast timing, whereas charge-readout using a segmented anode provides an accurate position reconstruction.

Detection of the charge signals requires extremely low noise electronics and a highly purified liquid devoid of any electro-negative components to be able to drift electrons in the liquid. The electrical properties of TMBi relevant for this measurement have barely been studied up to now. Therefore, a small volume detector for charge-readout tests was build to study the TMBi characteristics under high voltage. The poster will present the design and setup of the detector cell and provide preliminary results of the measurements.

This work is supported by the DFG (Project number: WE 1843/8-1; SCHA 1447/3-1) and via the Cells-in-Motion Cluster of Excellence under project number 406703021.

ST 3: Radiation monitoring and dosimetry II

Time: Wednesday 11:00–12:00 Location: H-HS II

ST 3.1 Wed 11:00 H-HS II

TL-DOS dose estimation study considering pre- and post-irradiation fading — •Hannah Jansen[1], Kevin Kröninger[1], Florian Mentzel[1], Jens Weingarten[1], and Jörg Walbersloh[2] — [1]TU Dortmund — [2]Materialprüfungsamt NRW

The sliding film dosimeters currently used for personal dosimetry have to be replaced soon, because they do not meet the legal requirements for a renewal of their type approval any more. The TL-DOS dosimetry system will replace them in the western part of Germany. TL-DOS is developed by the *Materialprüfungsamt NRW* and the *TU Dortmund*. It is based on thermoluminescence using LiF:Mg, Ti. Ionizing radiation excites electrons so that electrons and holes get captured in local energy states (traps). They get released by heating the detector and recombine. The number of recombination photons is proportional to the deposited dose. The so-called glow curve is a plot of the number of photons as function of detector temperature. The glow curve is mainly affected by two processes: the pre- and the post-irradiation fading. Electron and hole traps change their configuration over time which is called pre-irradiation fading. Additionally, the electron release already starts at room temperature which causes a time-dependent photon number. This is the post-irradiation fading. A better understanding of their effect on the glow curve is necessary to draw more precise conclusions about the irradiation circumstances such as the irradiation date. In this talk, I will present results of a measurement program varying pre- and post-irradiation fading times and radiation dose.

ST 3.2 Wed 11:15 H-HS II

Irradiation date estimation for personal dose monitoring using artificial neural networks — •Florian Mentzel[1], Kevin Kröninger[1], Jörg Walbersloh[2], and Jens Weingarten[1] — [1]TU Dortmund — [2]Materialprüfungsamt NRW

In cooperation with the Chair for Experimental Physics IV at the TU Dortmund, the Materialprüfungsamt NRW (MPA NRW) is developing the new dosimetry system TL-DOS based on thermoluminescence. This system will replace the currently used film badge dosemeter for personal dose monitoring.

During irradiation, thermluminescence dosemeters store deposited energy by trapping excited electrons in metastable states. These electrons are released and can recombine when the detector is heated. The amount of recombination photons is proportional to the irradiation dose. If additional information is derived from a personal dosemeter, this can be beneficial for the radiation protection of the monitored person. Knowledge about the irradiation date, for example, allows for better retracing of the source and reason for an unnoticed exposition to radiation.

I present the results of a study on the date of irradiation of personal dosemeters. Neural networks are used to analyze the time- and temperature-dependent recombination photon counts. We focus on the case of a single irradiation with a high dose within the monitoring interval of one month. Currently conducted studies are extending this proof-of-concept study with the long-term goal to transfer the developed methods to routine dose monitoring.

ST 3.3 Wed 11:30 H-HS II

Development of radiation-induced frequency shifts in TCXO crystal oscillators — •Luisa Speicher[1], Marius Hötting[1], Kevin Kröninger[1], Markus Markgraf[2], Florian Mentzel[1], Jan Pitann[2], Jörg Walbersloh[3], Jens Weingarten[1], and Andreas Spoerl[2] — [1]TU Dortmund, Lehrstuhl für Experimentelle Physik IV — [2]Deutsche Zentrum für Luft- und Raumfahrt —

[3]Materialprüfungsamt NRW

The German Space Operations Center has observed a shift in the clock frequency of GPS modules used in various satellite missions. This frequency is generated by a temperature compensated crystal oscillator (TCXO) and is important for position determination. The effect is caused by radiation on the satellites orbit.

The goal of this project is to find out whether this effect could be used in the field of dosimetry. As part of a master thesis which is part of a cooperation with the TU Dortmund, a more detailed investigation of the radiation effects on the quartz is carried out. Existing read-out systems and analysis methods are adapted for variable clock frequencies to gain a better understanding of this effect.

In this talk we will present recent results from the aforementioned project. The main focus of this talk will be the discussion of the correlation between the radiation-induced frequency shifts and the variable clock frequencies.

ST 3.4 Wed 11:45 H-HS II

Investigation of radiation-induced frequency shifts in TCXO crystal oscillators — •Marius Hötting[1], Kevin Kröninger[1], Markus Markgraf[2], Florian Mentzel[1], Jan Pitann[2], Luisa Speicher[1], Andreas Spoerl[2], Jörg Walbersloh[3], and Jens Weingarten[1] — [1]TU Dortmund, Lehrstuhl für Experimentelle Physik IV — [2]Deutsches Zentrum für Luft- und Raumfahrt — [3]Materialprüfungsamt NRW

The German Space Operations Center has observed a shift in the clock frequency of GPS modules used in various satellite missions. This frequency is generated by a temperature compensated crystal oscillator (TCXO) and is important for position determination. The effect is caused by radiation on the satellite's orbit.

The goal of this project is to find out whether this effect could be use in the field of dosimetry. As part of a master thesis which is part of a cooperation with the TU Dortmund University, a more detailed investigation of the radiation effects on the quartz is carried out. The observed frenquency shifts are very small compared to the signal frequency. Therefore, a read-out system and analysis method with very high precision is developed.

In this talk we will present recent results from the aforementioned project. This will include a short overview of the developed read-out system and the analysis method. The main focus of this talk will subsequently be the discussion of the correlation between the frequency shift and the radiation dose.

ST 4: DPG trifft DGMP - Berufsperspektiven in der Medizinischen Physik (joint session ST/AKjDPG)

Time: Wednesday 14:00–16:00 Location: H-HS II

ST 4.1 Wed 14:00 H-HS II

Der Weg zum Medizinphysikexperten (MPE): Was sind die nötigen Voraussetzungen zur Fachkunde im Strahlenschutz? — •Markus Buchgeister — Beuth Hochschule für Technik Berlin; Deutsche Gesellschaft für Medizinische Physik e.V.

Für die therapeutische Anwendung ionisierender Strahlung am Menschen (Strahlentherapie als Tele- oder Brachytherapie bzw. nuklearmedizinische Therapien) oder für Verfahren mit erhöhter Exposition in der radiologischen Diagnostik (Computertomographie und interventionelles Röntgen) ist die Beteiligung eines Medizinphysikexperten im Rahmen des Strahlenschutzes gesetzlich gefordert. Der Medizinphysikexperte ist ein Strahlenschutzbeauftragter, der für die jeweiligen Arbeitsfelder eine besondere Fachkunde im Strahlenschutz benötigt. Diese Fachkunde setzt sich zusammen aus einem Masterabschluss in Medizinischer Physik oder gleichwertig, erfolgreichen Abschluss von Grund- und Spezialstrahlenschutzkursen sowie Nachweis Zeiten praktischer Berufserfahrung, der sogenannten Sachkundezeit. Im Vortrag sollen insbesondere die Optionen für "Quereinsteiger" aufgezeigt werden, die keinen Masterabschluß in Medizinscher Physik besitzen.

Invited Talk ST 4.2 Wed 14:10 H-HS II

Vom Physiker zum Medizinphysiker — •Riccardo Valentini — Med 360° Rheinland GmbH, Leverkusen

Schon seit ihrer Entdeckung werden ionisierende Strahlen auch für medizinische Zwecke eingesetzt; nicht nur in dem Bereich der Diagnostik sondern auch in der Therapie der Patienten. Jede Form einer solchen Anwendung wird von sogenannten Medizinphysikern begleitet, mitgeführt und kontrolliert. Des Weiteren werden diese sowohl beratend als auch prozessführend hinzugezogen.

In der Strahlentherapie werden teils hohe Dosen ionisierender Strahlung direkt am Patienten angewandt, daher liegen die Hauptaufgaben eines Medizinphysikers vorrangig in der Optimierung, Dokumentation und Einhaltung des Strahlenschutzes sowie der Kommunikation mit den zuständigen Behörden. Ein weiterer wichtiger Aspekt besteht in der Bestrahlungsplanung. Hierbei plant und bestimmt der Medizinphysiker wie ein vom Arzt festgelegtes Zielvolumen mit einer Dosis zur Vernichtung von Tumorzellen versorgt wird und gleichzeitig umliegende Risikoorgane jedoch bestmöglich geschont werden können.

Seit der Neuerung des Strahlenschutzgesetzes steht im Fachgebiet der Radiologie neben der Beratung nun auch das Dosismanagement im Vordergrund. Somit üben Medizinphysiker planerische, überwachende und optimierende Tätigkeiten aus.

Die Medizinphysik wächst weiter in ihren Aufgaben und benötigt somit immer mehr Unterstützung von einer physikalisch-technischen Seite. So soll hier der Wechsel in diesen Beruf beschrieben werden.

Invited Talk ST 4.3 Wed 14:30 H-HS II

Vom Hochtemperaturplasma zum Innenohr: nur ein Random Walk — •Josef Seebacher — Univ.-Klinik für Hör-, Stimm- und Sprachstörungen, Medizinische Universität Innsbruck, Anichstrasse 35, A-6020 Innsbruck

Mein Einstieg in die Physik war das Studium an der Leopold Franzens Universität Innsbruck. Im Bereich Energiephysik spezialisierte ich mich auf Strömungsmechanik und verfasste eine Diplomarbeit zum Thema Luftströmungen in Straßentunneln. Während der Doktorarbeit beschäftigte ich mich mit Monte Carlo Modellen, um Random Walks von Kohlenwasserstoffmolekülen in heißen Kernfusionsplasmen zu beschreiben. Es folgten zahllose Forschungsaufenthalte am Forschungszentrum in Jülich, Deutschland, und in Culham, England. Am Ende der Dissertation habe ich einen FWF Antrag gestellt (äquivalent zu DFG in Österreich). Der Antrag wurde genehmigt und ich konnte eine zweijährige PostDoc Stelle zum Thema Kohlenwasserstofftransport in Hochtemperaturplasmen am Institut für Ionen und Angewandte Physik in Innsbruck antreten. Die PostDoc Stelle endete und aufgrund der Kettenvertragsklausel konnte meine Stelle nicht verlängert werden, trotz vorhandener Drittmittel. Durch Zufall habe ich damals von einer offenen PostDoc Stelle im Fach Audiologe an der Univ.-Klinik für Hör-, Stimm- und Sprachstörungen in Innsbruck erfahren. Nach erfolgreicher Bewerbung stieg ich in Ohrforschung ein. Bei der Winterschule in Pichl lernte ich zunächst viel über Aufbau und Funktion des menschlichen Ohres. Unter anderem auch über die Wellenausbreitung im Innenohr basierend auf den Gleichungen der Strömungsmechanik.

Invited Talk ST 4.4 Wed 14:55 H-HS II

Von der Chaosforschung bis zur Medizintechnik — •Thorsten Buzug — Universität zu Lübeck, Deutschland — Fraunhofer-Einrichtung für Marine Biotechnologie, Lübeck

Karrieren sind nicht planbar. Ich habe Physik studiert, weil ich wissen wollte, wie die Weilt funktioniert. Das Thema der Dissertation: Chaosforschung. Es war ein so wunderbar surreales Thema, nichtlineare chaotische Zustände mit den fraktalen Dimensionen ihrer seltsamen Attraktoren zu charakterisieren. Bis zur Promotion hat mein Studium 20 Semester gedauert, und keinen einzigen Tag habe ich mich gefragt, wie mein CV aussehen soll. Meine Karriere war dann weniger strategisch angelegt, sondern vom Erkennen von Gelegenheiten geprägt. Postdoc: bei der Forschungsanstalt der Bundeswehr für Wasserschall- und Geophysik in Kiel. Hier habe ich zunächst wegen des Kulturwechsels gezögert. Aber ich habe entschieden, mir von innen anzusehen, was viele ablehnen. Forschungsthema: Bildrekonstruktion aus Unterwasserschallsignalen. Danach Philips Forschung Hamburg: Medizinische Bildverarbeitung. Hier zeigte sich, dass die Mathematik zum Auffinden von Läsionen in MRT-Bildern, der Unterwasserbildrekonstruktion sehr ähnlich ist. Der erste Ruf auf eine C3-FH-Professur. Acht Jahre später: Leitung des Instituts für Medizintechnik der Uni Lübeck. Seit

2020: Leitung der Lübecker Fraunhofer-Einrichtung natürlich in der Schwerpunktsetzung Medizintechnik. Es mäandert und man weiß nie, wozu man die aktuellen Arbeiten später in noch ganz anderem Kontext anwenden könnte. Nichts, was man unterwegs lernt ist unwichtig. Chaosforschung ist heute z. B. wieder en vogue in der Medizintechnik.

Invited Talk ST 4.5 Wed 15:20 H-HS II

Von der Idee bis zur Auslieferung: Drei Jahre am Siemens Healthineers Standort Kemnath — •Olivia Stiehl — Siemens Healthineers, Kemnath, Germany

Siemens Healthineers zählt mit ca. 50.000 Mitarbeitern und einem Portfolio von Ultraschallsystemen über modernste Tomographen bis hin zu Labordiagnostik zu einem der weltweit größten Anbieter im Gesundheitswesen. Gut 1000 dieser Beschäftigten sind am Mechatronik-Standort Kemnath tätig, welcher sich durch die geschlossene Prozesskette von der Innovation über die Entwicklung, Technologiefertigung, Montage und Systemprüfung bis hin zur Inbetriebnahme im Krankenhaus auszeichnet.

Dort durchlaufe ich einen dreijährigen Entwicklungsplan mit dem Ziel das Unternehmen und seine Abläufe im Gesamtkontext kennenzulernen. Zu meinen Stationen zählen u.a. die Logistik, Fertigungssteuerung, Neuprodukteinführung und Produktmanagement. Neben dem fachlichen Kenntniserwerb in all diesen Bereichen, liegt der Fokus auf der Methodik: Exzellente Analysefähigkeiten aus dem Physikstudium ermöglichen erfolgreiche Optimierungsprojekte. Auch Projektmanagement, Kommunikationstechniken und Gelegenheit zu (lateraler) Führung zählen zu den Lernfeldern.

Diese Art von Berufseinstieg ermöglicht es Unbekanntes kennenzulernen und bildet eine herausragende Basis für die Weiterentwicklung im Unternehmen, unabhängig von der im Anschluss eingeschlagenen Ausrichtung.

Discussion ST 4.6 Wed 15:45 H-HS II

Berufsperspektiven in der Medizinischen Physik — Riccardo Valentini[2], Josef Seebacher[3], Thorsten Buzug[4], Olivia Stiehl[5], Markus Buchgeister[6] und •Anna Bakenecker[1] — [1]Fachverband Strahlen- und Medizinphysik — [2]Med 360° Rheinland GmbH, Leverkusen — [3]Univ.-Klinik für Hör-, Stimm- und Sprachstörungen, Medizinische Universität Innsbruck, Anichstrasse 35, A-6020 Innsbruck — [4]Fraunhofer- Einrichtung für Marine Biotechnologie, Lübeck — [5]Siemens Healthineers, Kemnath, Germany — [6]Beuth Hochschule für Technik Berlin; Deutsche Gesellschaft für Medizinische Physik e.V.

Im Anschluss an die Vorträge stellen sich die Referenten aus universitärer Forschung, Klinik, Fraunhofer und Großunternehmen Ihren Fragen Rund um den Berufseinstieg im Bereich der Medizinischen Physik.

ST 5: Combined detector session: EP, HK, ST, T (joint session HK/T/ST/EP)

Time: Wednesday 16:30–18:30 Location: H-HS X

Invited Talk ST 5.1 Wed 16:30 H-HS X

Detectors for Measuring Space Radiation — •Robert F. Wimmer-Schweingruber and and the Kiel Extraterrrestrial Physics Team — Christian-Albrechts-Universität zu Kiel, Kiel, Germany

Radiation in the solar system comes from various sources, primarily galactic cosmic radiation (GCR) and solar (cosmic) radiation, as well as particles trapped and/or accelerated in and at planetary magnetospheres and traveling shock waves. While measurements of radiation on Earth and in its atmosphere have been performed for more than a century, measuring space radiation is more complicated, mainly because of the limited resources available on spacecraft. In this talk I will discuss examples of how to measure space radiation on Mars, the Moon, and in the inner solar system, i.e., between the Sun and Earth, thus covering measurements on a body with a (thin) atmosphere, with no atmosphere, and in free space. The examples include the Radiation Assessment Detector (RAD) on NASA*s Mars Science Laboratory (MSL), the Lunar Lander Neutrons and Dosimetry (LND) instrument on China*s Chang*E 4 lander on the far side of the Moon, and the four sensors STEP, EPT, SIS, and HET on ESA*s Solar Orbiter which is scheduled for launch on February 7, 2020, at the time of writing this abstract.

Invited Talk ST 5.2 Wed 17:00 H-HS X

Modern Timing Detectors in HEP — •Jörn Lange — II. Physikalisches Institut, Georg-August-Universität Göttingen, Germany

Particle detectors with precise time information are traditionally used in HEP as time-of-flight detectors. A new generation of high granularity and radiation-hard timing detectors with a precision of few tens of picoseconds is being developed for event time measurements at the High-Luminosity upgrades of the LHC experiments. By measuring the arrival time of each particle in the detector, its underlying collision vertex can be identified to suppress the background from event pileup in an environment with up to 200 collisions per proton-proton bunch crossing. This is made possible thanks to the rapid advance of new detector technologies like Silicon Low Gain Avalanche Detectors (LGADs). For the longer term future, 4D tracking detectors are being developed, which combine precise timing with the high granularity and spatial resolution of today's pixel detectors, enabling enhanced pattern recognition in high density track environments. This presentation will motivate and introduce the novel timing detectors and their technologies. New developments such as 4D-tracking and possible other applications will be discussed as well.

Invited Talk ST 5.3 Wed 17:30 H-HS X

Experimental time resolution limits of modern SiPMs and TOF-PET detectors — •Stefan Gundacker — CERN, Esplanade de Particules 1, 1211 Meyrin, Switzerland — UniMIB, Piazza dell'Ateneo Nuovo, 1-20126, Milano, Italy

Time Of Flight (TOF) information applied in Positron Emission Tomography (PET) has shown to improve the image quality, shorten scan times and reduces the patient radiation dose. A Coincidence Time Resolution (CTR) in the range of 20 ps FWHM would enable to access image voxels of $3x3x3mm^3$ along the line of response and is likely to revolutionize clinical PET. Inorganic scintillator-based detectors are able to record the 511 keV annihilation gammas with high sensitivity and have strongly benefited from the appearance of solid-state photodetectors (e.g. the SiPM), new crystal types (e.g. LYSO:Ce codoped with divalent ions) and improved front-end electronic readout. Such developments enabled commercial PET systems to achieve CTRs around 210 ps FWHM (Siemens Biograph vision). Nevertheless, a complete assessment of state-of-the-art scintillators and SiPMs in terms of their currently achievable time resolution limits was still missing and will be given in this paper. That is important, as it helps to define future strategies and directions of research in order to improve the system CTR by at least an order of magnitude. Furthermore, general aspects of the theoretical CTR limits in TOF-PET will be discussed along with some considerations on how to bring promising laboratory results into real world medical applications.

Invited Talk ST 5.4 Wed 18:00 H-HS X

260 megavoxel camera with continuous readout - the upgraded ALICE TPC — •Laura Fabbietti for the ALICE-Collaboration — JamesFranckstr. 1

The ALICE Time Projection Chamber (TPC) is the world largest detector of this type. It is the main tracking and PID device of the ALICE detector. It is currently being upgraded with a new readout system, including new GEM-based Readout Chambers and new front-end electronics. The upgraded TPC will operate in continuous mode, recording the full minimum-bias interaction rate of 50 kHz in Pb-Pb offered by the LHC in Run 3 and beyond. This will result in a significant improvement on the sensitivity of rare probes*that are considered key observables to characterise the QCD matter created in such*collisions. In this presentation I will discuss the physics potential of the upgraded TPC and show the status of the TPC upgrade activities during the ongoing LHC Long Shutdown 2. First results of the commisioning tests will be presented.

ST 6: Medical Imaging

Time: Thursday 11:00–12:00 Location: H-HS II

ST 6.1 Thu 11:00 H-HS II

Contrast enhanced 3D X-ray histology: from preclinical to clinical applications — •Madleen Busse[1], Simone Ferstl[1], Melanie Kimm[2], Mark Müller[1], Enken Drecoll[3], Toni Bürkner[1], Sebastian Allner[1], Lorenz Hehn[1], Martin Dierolf[1], Klaus Achterhold[1], Julia Herzen[1], Daniela Pfeiffer[2], Ernst Rummeny[2], Wilko Weichert[3], and Franz Pfeiffer[1,2] — [1]Department of Physics and MSB, TU Munich, Garching, Germany. — [2]Department of Diagnostic and Interventional Radiology, TU Munich, Munich, Germany. — [3]Department of Pathology, TU Munich, Munich, Germany.

Histopathology is currently the diagnostic gold standard. It is, however, destructive providing only 2D information [1]. 3D X-ray histology overcomes these limitations by visualizing 3D tissue microstructure, which is essential for a holistic pathological characterization [2]. We recently developed a laboratory-based method enabling 3D virtual histology based on contrast enhanced nanoscopic X-ray CT [3]. Here, we present the application of this method to human biopsy samples. The CT slices reproduce crucial structures with a similar detail level as corresponding histological light microscopy images. Deeper insights into the 3D configuration of the tissue can be gained from our 3D data. In addition, compatibility with standard pathological stains highlights the feasibility of integrating our method into the pathological workflow.

[1] S. K. Suvarna et al. (2013). Theory and Practice of Histological Techniques, Edn. 7th., Elsevier, Oxford. [2] M. Müller et al., Sci. Rep. 8 (1) (2018) 17855. [3] M. Busse et al., PNAS 115 (2018) 2293-2298.

ST 6.2 Thu 11:15 H-HS II

Photon-Counting Detectors for Conventional and Spectral Breast Imaging — •Mirko Riedel, Lisa Heck, Thorsten Sellerer, Korbinian Mechlem, Josef Scholz, Christian Petrich, Lorenz Birnbacher, Martin Dierolf, and Julia Herzen — Chair of Biomedical Physics, Department of Physics and Munich School of BioEngineering, Technical University of Munich, 85748 Garching, Germany

Contrast-enhanced spectral mammography (CESM) is used as method for follow-up examinations in case of uncertain mammography findings. CESM has been successfully demonstrated in case of narrow polychromatic [1] and quasi monochromatic spectra. By the introduction of energy-resolving photon-counting detectors to medical imaging research, novel imaging techniques have been developed. In order to evaluate the performance of these techniques, we compared different photon-counting detector systems on conventional mammography and CESM. Three methods to obtain an iodine image, including K-edge subtraction (KES) in two measurements, one-shot KES and a two-material decomposition [2], were investigated with novel detectors. The contrast-to-noise ratios for all three methods have been compared to evaluate their ability to depict the iodine distribution.

[1] Lewin, J. M., et al. "Dual-energy contrast-enhanced digital subtraction mammography: feasibility." Radiology 229.1 (2003)
[2] Mechlem, K., et al. "Spectral angiography material decomposition using an empirical forward model and a dictionary-based regularization." IEEE transactions on medical imaging 37.10 (2018)

ST 6.3 Thu 11:30 H-HS II

Breast Imaging with a Grating-Based X-Ray Phase Contrast Setup — •Wolfgang Gottwald[1], Lisa Heck[1], Lorenz Birnbacher[1,2], Karin Hellerhoff[3], Susanne Grandl[3], Josef Scholz[1], Christian Petrich[1], Mirko Riedel[1], Stephan Metz[2], Daniela Pfeiffer[2], and Julia Herzen[1] — [1]Chair of Biomedical Physics, Department of Physics and Munich School of BioEngineering, Technical University of Munich, Germany — [2]Department of Diagnostic and Interventional Radiology, School of Medicine and Klinikum rechts der Isar, Technical University of Munich, Germany — [3]Department of Diagnostic Radiology, Rotkreuzklinikum Munich, Germany

Previous studies have shown that phase-contrast and dark-field x-ray imaging have a great potential to improve the conventional absorption based method used for breast imaging. (Scherer, K et al. 2014 and Scherer, K et al. 2015) Especially dense breast tissue exhibits minor deviations in the attenuation-based signal, therefore resulting in low soft tissue contrast for absorption-contrast imaging. This can be circumvented by utilizing the electron density contrast with our phase-sensitive technique. In this study dark-field, phase-contrast and absorption signals can be obtained simultaneously by grating-based phase stepping. In order to further push grating-based phase-contrast for breast imaging, an existing setup at a laboratory x-ray source was optimized and its performance evaluated. In this work we aim to improve the image quality of breast imaging at the current setup by testing its capabilities with freshly dissected mastectomy samples.

ST 6.4 Thu 11:45 H-HS II

Measurement of Acoustic Properties of Passive Materials for the Use in 3D Ultrasound Computer Tomography Transducers — •Julia Koppenhöfer, Martin Angerer, and Nicole Ruiter — Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

The KIT is developing a 3D Ultrasound Computer Tomography (USCT) system for the early detection of breast cancer. The USCT system consists of 128 x 18 transducers with a centre frequency of 2.2MHz. These interchangeably send and receive ultrasound (US) pulses from which a 3D model of the breast is calculated.

To optimize the future USCT device in regard to image reconstruction performance, transducers with new materials and assemblies need to be simulated before the most promising ones are built and tested. The accuracy of these simulations depends on the properties speed of sound and acoustic impedance of the materials utilized in the transducers. Literature values either do not exist or are inaccurate as having been measured for outdated compositions of the material.

We measure the speed of sound of a material by placing a sample inside a water tank equipped with US emitter and receiver on opposite sides. The time lapse between sent and received signal is measured for different sample lengths and the speed of sound calculated from the slope. The density of each material is measured, and the acoustic impedance calculated from the density and speed of sound. In this talk, an overview of the 3D USCT system is given, methods to measure the speed of sound are discussed and results are presented.

ST 7: Radiation Therapy and Detector Physics

Time: Thursday 14:00–15:30 Location: H-HS II

ST 7.1 Thu 14:00 H-HS II

Intraokulare Anpassung des Dosisprofils in der Brachytherapie — Nora Marlog[1], Corinna Pass[1], •Henning Manke[2,3] und Dirk Flühs[3] — [1]Elektrotechnik und angewandte Naturwissenschaften, Westfälische Hochschule — [2]Experimentelle Physik 5, TU Dortmund — [3]Strahlenklinik, Universitätsklinikum Essen

Die Brachytherapie intraokularer Tumoren mittels Ruthenium- und Iod-Applikatoren ist hinsichtlich der Schonung von gesundem Gewebe durch die Form der Strahlenquellen und der Reichweite der Strahlung limitiert. Individuelle Abschirmungen ermöglichen die Anpassung des Strahlenfeldes an das Zielvolumen. Für die klinische Routine eignen sich diesbezüglich insbesondere Formgussteile aus Silikonen, die für die Implantation freigegeben sind, und Metallpulver, welches ebenfalls als physiologisch verträglich gilt. Mit Hilfe von dosimetrischen Messungen und Simulationen wird untersucht, inwieweit speziell gefertigte Abschirmungen, die ins Auge eingebracht werden können, die Dosisprofile der Strahlungsquellen beeinflussen, um die Therapie zu optimieren.

ST 7.2 Thu 14:15 H-HS II

Comparative measurement of $^{12}C(p,pn)^{11}C$-cross section for particle therapy — •Claus Maximilian Bäcker[1,2,3,4], Wihan Adi[5], Christian Bäumer[2,3,4], Marcel Gerhardt[1], Felix Horst[6,7], Kevin Kröninger[1], Christoph Schuy[7], Beate Timmermann[2,3,4,8], Nico Verbeek[2,3,4], Jens Weingarten[1], and

Jörg Wulff[2,3,4,6] — [1]TU Dortmund, Experimentelle Physik IV, 44227 Dortmund — [2]Westdeutsches Protonentherapiezentrum Essen, 45122 Essen — [3]Westdeutsches Tumorzentrum, 45122 Essen — [4]Universitätsklinikum Essen, 45122 Essen — [5]II. Physikalisches Institut, Justus-Liebig-Universität, 35392 Giessen — [6]Institut für Medizinische Physik und Strahlenschutz, Technische Hochschule Mittelhessen, 35390 Gießen — [7]GSI Helmholtzzentrum für Schwerionenforschung, 64291 Darmstadt — [8]Universitätsklinikum Essen, Klinik für Partikeltherapie, 45122 Essen

For PET imaging as a range verification method in proton therapy, an accurate knowledge of the activation cross sections is required to determine the expected β^+ activity distribution.

For the ^{12}C(p,pn)^{11}C-reaction, the measured cross sections accumulate around two excitation functions, which are about 15% apart. This difference exists also in the recent measurements from Essen / Dortmund and Giessen / Darmstadt. By comparison of both experimental studies and cross check of parameters, like irradiation technique or target size and material, the reason for the difference is investigated and several parameters have already been successfully excluded as a reason for this difference. In this talk, the current results will be presented.

ST 7.3 Thu 14:30 H-HS II

Simulation zeitabhängiger Energiespektren für die Messung prompter Gammastrahlung in der Protonentherapie — •Max Küchler[1], Arno Straessner[1], Olga Novgorodova[1], María González Torres[1], Guntram Pausch[2,3], Toni Kögler[2,3] und Marius Walther[1] — [1]Technische Universität Dresden — [2]OncoRay Dresden — [3]Helmholtz-Zentrum Dresden-Rossendorf

In der Protonentherapie stellt die Verifikation der errechneten Reichweite der Protonen im Gewebe während der Behandlung eine Herausforderung dar, da sich z.B. Schwellungen oder Hohlräume bilden können. Diese Arbeit analysiert eine Methode, die das Energiespektrum der entstehenden prompten Gammastrahlung in Abhängigkeit von der Eindringtiefe der Protonen aufnimmt und mit Referenzspektren vergleicht. Auf diese Weise lässt sich ein Maß für die Abweichung der gemessenen Energiespektren vom erwarteten Spektrum ermitteln, und somit auch die Übereinstimmung der aktuellen Materialzusammensetzung im Gewebe mit den zuvor bestimmten Werten. Es wird untersucht, inwiefern diese unter Idealbedingungen funktionierende Methode auch in Simulationen unter Realbedingungen Anwendung finden kann. Limitiert wird diese Methode hierbei zum einen durch die Anzahl der Photonen, welche pro Behandlungspunkt entstehen, da diese die Statistik der Energiespektren bestimmen. Zum anderen besitzen die Protonen eine bunch-interne Zeitstruktur, sodass eine korrekte Zuordnung der Energiespektren zur Eindringtiefe erschwert wird. Ob diese Methode trotz Limitierungen in der Realität Einsatz finden kann und wenn ja, wo ihre Grenzen liegen, soll im Vortrag diskutiert werden.

ST 7.4 Thu 14:45 H-HS II

Shielding Design for a Small Animal Proton Irradiation Platform — •Francesca Neri[1], Tim Binder[1], Jonathan Bortfeldt[1], Daniel Köpl[2], Neeraj Kurichiyanil[1], Marco Schippers[3], Peter G. Thirolf[1], Matthias Würl[1], Indra Yohannes[2], Marco Pinto[1], and Katia Parodi[1] — [1]Ludwig-Maximilians-Universität, Munich, Germany — [2]Rinecker Proton Therapy Center, Munich, Germany — [3]Paul Scherrer Institute, Villigen, Switzerland

The SIRMIO project aims to realize an innovative, portable system for precision image-guided treatment, suitable for installation at existing proton therapy facilities and able to degrade and refocus clinical beams for adaptation to small animal irradiation. The about 1 m long beamline design is adaptable to deliver proton beams with energies from 20 to 50 MeV and includes permanent quadrupole magnets, dynamic collimators and a degrader. The transport of a clinical proton beam implies the activation of certain beamline elements, necessitating the employment of proper shielding to protect the users and to minimize the exposure of small animals to secondary radiation. Gamma spectroscopy experiments using material samples of the beamline elements have been carried out for an assessment of the shielding needs. The results show that gamma emission up to about 4 MeV is observed, primarily from the collimator material. The time-dependent energy spectra, subsequent radionuclide identification and decay analysis are used for a comprehensive validation of the simulation tools used for the shielding design of the full-scale platform. This work is supported by the European Research Council (grant agreement 725539).

ST 7.5 Thu 15:00 H-HS II

Energy Resolution of a Compton Camera Absorber Detector with SiPM Readout for up to 6.13 MeV — •Tim Binder[1,2], Katia Parodi[1], Florian Schneider[2], and Peter G. Thirolf[1] — [1]Ludwig-Maximilians Universität, Munich, Germany — [2]KETEK GmbH, Munich, Germany

The capability of spatially resolved γ detection is required in many applications in modern physics. A Compton camera (CC) allows to spatially resolve the γ-ray origin while still providing an acceptable efficiency compared to other detection setups. In medical physics a CC can be used to detect prompt γrays to verify the range of a hadron beam in the body during a patient's tumor treatment or to detect a higher energetic γ ($\sim$1.5 MeV) which is coincidently emitted by a β^+ emitter (e.g. ^{44}Sr) in a so-called Gamma-PET scanner. The γ origin is obtained, by using the kinematics of Compton scattering, where the energy and interaction position of the primary and the scattered γ is of major interest. Consequently, the energy resolution of the CC, consisting of a scatter and an absorber detector, is a key parameter.In this work, the energy resolution over a wide energy range (100 - 6130 keV) of a monolithic (50 x 50 x 30 mm^3) $LaBr_3$:Ce and a $CeBr_3$ scintillator, respectively, with KETEK SiPM array readout and the PETsys TOFPET2 ASIC data acquisition system will be presented. Furthermore, a comparison study between SiPM with 25 μm and 50 μm microcell sizes will be shown and compared to a PMT readout. This work was supported by the DFG Cluster of Excellence MAP (Munich-Centre for Advanced Photonics) and the Bayerische Forschungsstiftung.

ST 7.6 Thu 15:15 H-HS II

Detection of Compton Electrons for Medical Applications Using Cherenkov Light — •Reimund Bayerlein, Hedia Bäcker, Ivor Fleck, and Jona Bensberg — Universität Siegen, Deutschland

A novel principle for the electron measurement in a Compton Camera - used for the detection of higher energetic photons ($\geq$1 MeV) in medical applications - is presented. Using coincident detection of Cherenkov photons generated by the electron in an optically transparent radiator material an estimation of the scattering vertex, the electron energy and momentum is possible. Requirements and challenges of this concept will be discussed. A proof of principle is presented showing the coincident detection of Cherenkov photons created by electrons in PMMA on a 8x8 Silicon-Photomultiplier array. The single photon timing resolution (SPTR) is on the order of 485 ps. The number of detected Cherenkov photons can be counted using the signal's Time over Threshold information. Spatial sensitivity for the electron source location from accumulated and single coincident events will be presented and compared to extensive simulations using Geant4. The ability to detect actual Compton scattered and photo electrons using Cherenkov light will be demonstrated using 511 keV photons from a ^{22}Na source. The efficiency for the detection of higher energetic photons with this new concept as well as the resolution of the electron energy and the applicability in a Compton Camera will be discussed.

ST 8: Annual General Meeting

Time: Thursday 16:30–17:30 Location: H-HS II

Duration: 60 min.