T 51: Invited Topical Talks I-B

Time: Wednesday 11:00–12:20 Location: HSZ/0003

Invited Topical Talk T 51.1 Wed 11:00 HSZ/0003

LUXE – A new experiment to study non-perturbative QED in electron-laser and photon-laser collisions — •Ruth Jacobs — Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

The LUXE experiment (Laser Und XFEL Experiment) is a new experiment in planning at DESY Hamburg using the electron beam of the European XFEL. At LUXE, the aim is to study collisions between a high-intensity optical laser and up to 16.5GeV electrons from the Eu.XFEL electron beam, or, alternatively, high-energy secondary photons. The physics objectives of LUXE are to measure processes of Quantum Electrodynamics (QED) at the strong-field frontier, where QED is non-perturbative. This manifests itself in the creation of physical electron-positron pairs from the QED vacuum. LUXE intends to measure the positron production rate in a new physics regime at an unprecedented laser intensity. Additionally, the high-intensity Compton photon beam of LUXE can be used to search for physics beyond the Standard Model.

Invited Topical Talk T 51.2 Wed 11:20 HSZ/0003

Precision timing with silicon sensors — •Annika Vauth — Institut für Experimentalphysik, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg, Deutschland

Precision timing with silicon is an important tool in many areas of particle physics, either by adding a dedicated timing layer for track timing to a detector, or full "4D-tracking" where precise space and time coordinates are assigned to each hit.

Intense R&D is taking place in the design and optimisation of different types of silicon sensors to achieve excellent timing performance. Two examples for promising technologies are Low Gain Avalanche Diodes, which have been shown to achieve time resolutions of 30 ps or better, as well as 3D sensors, which display excellent radiation hardness. In this contribution, the currently existing technological solutions and ongoing research addressing the remaining challenges are reviewed. Future applications for precision timing will be presented.

Invited Topical Talk T 51.3 Wed 11:40 HSZ/0003

Recent advancements in Micro-Pattern Gaseous Detectors: Exciting research ahead towards future experiments — •Michael Lupberger — Helmholtz-Institut für Strahlen- und Kernphysik — Physikalisches Institut — Forschungs- und Technologiezentrum Detektorphysik, Bonn, Germany

The invention of Micro-Pattern Gaseous Detectors (MPGDs), overcoming the limitation of wire-based devices, marked a new epoch in the field of gaseous detectors. MPGDs, as 2nd generation gaseous detectors, were installed with large sizes in LHC experiments within the Long Shutdown 2 upgrades - more than 20 years after their invention.

The RD51 collaboration supported this path from prototypes to large area detectors, and promotes further MPGD R&D.

Major advancements have been achieved recently, opening up novel opportunities for exciting research and future experiments: The long-standing timing limitation of planar detectors was overcome with the PICOSEC concept, achieving 17 ps time resolution. With the implementation of the VMM chip into RD51's general Scalable Readout System, R&D support for the next decade is secured as well as new high-rate mid-size experiments are enabled. The GridPix technology with its single electron detection capability allows imaging of the fundamental particle-gas interaction and its features at a microscopic level.

These highlights will be presented, taking the prospects of the ECFA Detector R&D Roadmap and the transition from RD51 to DRDC1 into account.

Invited Topical Talk T 51.4 Wed 12:00 HSZ/0003

Recent Liquid Scintillator Developments for Astroparticle Physics — •Stefan Schoppmann — Johannes Gutenberg-Universität Mainz, Exzellenzcluster PRISMA+, PRISMA Detektorlabor, Staudingerweg 9, 55128 Mainz, Germany

Liquid scintillators have been used for decades in many experiments. They are particularly suited for the detection of low-energy particles where energy and timing information is required. Liquid scintillators exhibit advantages such as high light yield, cost effectiveness, radiopurity, and more.

In recent years, various developments aim for improving the vertex and directional resolution as well as particle identification of liquid scintillators. These ideas include advanced detector instrumentations, fine-grained vertex reconstruction, hybrid scintillators, and more. These novel approaches open a rich physics programme reaching from reactor neutrinos and searches for Majorana particles to solar and astrophysical neutrinos and beyond.

In this presentation, the status of novel approaches to liquid scintillators is reviewed and their prospects and applications compared.