

SCINTILLATOR DETECTORS: from Theory to Applications

(Medicine, Security, High Energy Physics and Engineering)

The new series of seminars and meeting on the fields of scintillator detectors will start with two short lectures given by Prof. Gintautas Tamulaitis.

These two lectures will cover the basics, key features and capabilities of scintillation detectors. Applications of the detectors in high energy physics experiments and medical imaging as well as the trends for further development in response to new challenges in these applications will also be addressed. A special attention will be paid to the development of novel scintillator materials and the attempts to substantially improve the time resolution of the scintillator.



Prof. Gintautas Tamulaitis

Vilnius University, Lithuania

Professor at the Institute of Photonics and Nanotechnology, Vilnius University, Lithuania. His background is in semiconductor physics, luminescence spectroscopy and nonlinear optics. Currently, his research is focused on studying materials for fast scintillator detectors of ionizing radiation. Prof. G. Tamulaitis is a member of the Lithuanian Academy of Sciences, a winner of two Lithuanian National Science awards. He is currently teaching courses on materials characterization techniques, photonics and electronics markets, and scientific concept of the world at the Faculty of Physics, Vilnius University.



I-Application fields of scintillation detectors Scintillators and detectors

22th June 2022 10:30-
12:30,
room **155/10**

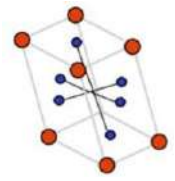
II-Time resolution as currently the key challenge in development of scintillation detectors Advanced materials for scintillation detectors

23th June 2022 10:30-
12:30
room **155/10**

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Vilnius University





SCINTILLATOR DETECTORS: from Theory to Applications (Medicine, Security, High Energy Physics and Engineering)

Lecture #1

Prof. Gintautas Tamulaitis
Vilnius University, Lithuania

I-Application fields of scintillation detectors Scintillators and detectors

Room **155/10, June 22th 2022, 10.30 – 12.30**

Facoltà di Ingegneria, Università Politecnica delle Marche,

Topics

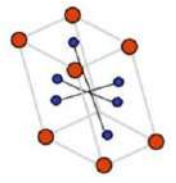
Application fields of scintillation detectors. Calorimetry and tracking in high energy physics experiments. Spillover effect. Medical imaging: X-ray screening, Positron Emission Tomography (PET). Oil well logging. Radiometric dating.

Scintillator detectors. Operation principles, scintillation mechanisms, activated and self-activated scintillators, excitation transfer in scintillators. Scintillation yield; internal quantum efficiency, light extraction. Energy resolution. Radiation tolerance. Density and stopping power. Cost and resources for large-scale production. Challenges for future radiation detectors: high-luminosity experiments at CERN and other large high energy physics facilities, medical imaging with higher spatial resolution and full body medical scanners

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SCINTILLATOR DETECTORS: from Theory to Applications (Medicine, Security, High Energy Physics and Engineering)

Lecture #2

Prof. Gintautas Tamulaitis
Vilnius University, Lithuania

**II-Time resolution as currently the key challenge in development of
scintillation detectors
Advanced materials for scintillation detectors**

Room 155/10, June 23th 2022, 10.30 – 12.30

Facoltà di Ingegneria, Università Politecnica delle Marche,

**Time resolution as currently the key challenge in development of
scintillation detectors.** Properties limiting the time resolution and methods
to measure the detector response kinetics.

Advanced materials for scintillation detectors. Inorganic and organic
scintillators. Prospective scintillators: lead tungstate (PWO), bismuth
germanate (BGO), cerium-doped silicates and garnet-type mixed crystals.
Nanostructured scintillators.

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