Università Politecnica delle Marche
Centro di Ricerca e Servizi di Analisi Globale dei Cristalli
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Series of Seminars:

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

Seminar #3

Prof. Martin Nikl
Institute of Physics, Academy of Sciences of The Czech Republic, Prague

Inorganic scintillation materials: R&D state-of-art and trends

Room 160/3, May 11th 2018, 10.30 – 11.30
Facoltà di Ingegneria, Università Politecnica delle Marche,
Web-streaming: https://meet.lync.com/univpm-pm/s1062746/E9X2T63W

Topic

In our laboratories the first single crystal scintillator studies date back to early 1990's when $YAlO_3$ and $LuAlO_3$ aluminum perovskites and CeF_3 were studied in the frame of new Crystal Clear Collaboration coordinated from CERN for high energy physics (HEP) and medical instrumentation detectors. Later on, high density $PbWO_4$ became the choice for HEP and was used in LHC accelerator in CERN at which the Higgs boson has been recently discovered.

The new millennium brought heavy garnet scintillators based on $Lu_3Al_5O_{12}$ crystals and a new class of ultra-efficient multicomponent garnets based on $(Gd,Lu,Y)_3(Al,Ga)_5O_{12}$ solid solution. All these perovskite and garnet scintillators are doped with Ce^{3+}, eventually by Pr^{3+}, to explore their fast 5d-4f emission transition which gives rise to scintillator response dominated by few-to-several tens of nanoseconds decay time.

The most recent activities include the research of nanocomposite and nanostructured materials with the aim to create superfast scintillators with the response below 1 ns usable for fast timing in time-of-flight techniques in high energy physics and medical imaging. In this talk the review of state-of-art activities in the field of selected scintillator materials will be provided with existing trends for near future.

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