

## List of Prepublications, Publications and Reports

- FALLAVOLLITA F., “*Construction and performance study of the new Micro Pattern Gaseous Detectors for future upgrades of the CMS muon high rate region at the LHC*”, CERN Summer Student Report, August 2015.

*Abstract:* We have tested a new type position-sensitive gaseous proportional detector, called the *Fast Timing Micropattern (FTM)* detector, based on advanced printed circuit board technology, for fast timing applications. The construction feasibility has been demonstrated by building a first working prototype. We expect that this technique can be exploited for applications in high energy physics experiments, particularly for upgrades at *LHC* where sub nanosecond time resolutions are critical for particle identification and vertex separation. Other applications include X-ray diffraction studies and fast time-resolved measurements offer excellent medical imaging opportunities. In combination with an X-ray convertor and *FTM* and a visible photocathode shows great promise for use in digital mammography. Other applications include X-ray astronomy by exploiting time resolution of the *FTM* and selective sensitivity to soft X-rays.

*Cite as:* <http://cds.cern.ch/record/2046125>

- ZENONI A., BONOMI G., DONZELLA A., PAGANO D., BARONIO G., BODINI I., BARNABA' O., FALLAVOLLITA F., NARDO' R., ROSSELLA M., VITULO P. and ZUMERLE G., “*Historical building stability monitoring by means of a cosmic ray tracking system*”, International Journal of Modern Physics: Conference Series - Vol. 1, No. 1 (2010) 1-5.

*Abstract:* The ubiquitous and steady presence at the Earth's surface and the high penetration capability of cosmic rays, have motivated their use in different fields beyond particle physics. Recently, a new application of cosmic ray detection techniques in the field of civil engineering has been proposed. The aim is the stability monitoring of large structures, in particular the static monitoring of historical buildings, where conservation constraints are more severe and the time evolution of the deformation phenomena under study may be of the order of months or years. As a significant case study, the monitoring of the wooden vaulted roof of the “Palazzo della Loggia” in the town of Brescia, in Italy, has been considered. The feasibility as well as the performance of a monitoring system based on cosmic ray tracking have been studied by Monte Carlo simulation. Possible improvements both in the detector system and in the statistical analysis of the collected data are discussed.

- BODINI I., ZENONI A., BONOMI G., DONZELLA A., BARONIO G., VITULO P., FALLAVOLLITA F., and ZUMERLE G., “*Monitoraggio dallo spazio. Tracciamento di raggi cosmici per il monitoraggio di edifici storici*”, TUTTO MISURE, 16, n. 04 (2014): pp 279 - 282.

*Abstract:* In questo articolo vengono riportati i risultati di uno studio, basato su simulazioni Monte Carlo, volto a determinare la fattibilità, le potenzialità e i limiti di un sistema di monitoraggio basato sulla rivelazione di raggi cosmici. Tale sistema è stato pensato per applicazioni su edifici storici, dove le deformazioni che devono essere misurate avvengono in periodi di tempi lunghi anche messi o anni e dove, per motivi di tutela, è bene che le tecniche utilizzate siano conservative.

- ZENONI A., BONOMI G., DONZELLA A., SUBIETA M., BARONIO G., BODINI I., CAMBIAGHI D., LANCINI M., VETTURI V., FALLAVOLLITA F., NARDO' R., RICCARDI C., ROSSELLA M., VITULO P. and ZUMERLE G., “*Historical building stability monitoring by means of a cosmic ray tracking system*”, electronic prepublication arXiv: 1403.1709 - Instrumentation and Detectors (physics.ins-det).

*Abstract:* Cosmic ray radiation is mostly composed, at sea level, by high energy muons, which are highly penetrating particles capable of crossing kilometers of rock. Cosmic ray radiation constituted the first source of projectiles used to investigate the intimate structure of matter and is currently and largely used for particle detector test and calibration. The ubiquitous and steady presence at the Earth's surface and the high penetration capability has motivated the use of cosmic ray radiation also in fields beyond particle physics, from geological and archaeological studies to industrial applications and civil security. In the present paper, cosmic ray muon detection techniques are assessed for stability monitoring applications in the field of civil engineering, in particular for static monitoring

of historical buildings, where conservation constraints are more severe and the time evolution of the deformation phenomena under study may be of the order of months or years. As a significant case study, the monitoring of the wooden vaulted roof of the “Palazzo della Loggia” in the town of Brescia, in Italy, has been considered. The feasibility as well as the performances and limitations of a monitoring system based on cosmic ray tracking, in the considered case, have been studied by Monte Carlo simulation and discussed in comparison with more traditional monitoring systems. Requirements for muon detectors suitable for this particular application, as well as the results of some preliminary tests on a muon detector prototype based on scintillating fibers and silicon photomultipliers SiPM are presented.

*Cite as:* <http://arxiv.org/abs/1403.1709>

- BACCARO S., CEMMI A., FALLAVOLLITA F., “**Radiation damage of YAG:Pr scintillator under gamma irradiation**”, ENEA Rapporto Tecnico ENEA - UTTMAT (Unità Tecnica Tecnologie dei Materiali), RT/2012/21/ENEA.

*Abstract:* A set of YAG : Pr<sup>3+</sup> crystals were submitted to  $\gamma$  irradiation at the <sup>60</sup>Co Calliope radioisotope plant, (Research Centre ENEA – Casaccia, Rome), in order to investigate their radiation hardness. The radiation induced behavior of the analyzed samples turned out to be strongly dependent on the doping and on the growth conditions of crystals. Their behaviour after irradiation was investigated by transmission measurements (UV-VIS), Thermo Stimulated Luminescence (TSL) and Light Yield, in order to study the radiation-induced colour centres formation and their performances as scintillating materials. A recovery mechanism due to Pr<sup>3+</sup> ions in the crystals has been found and a possible way to improve the crystal radiation hardness has been discussed.

## Conferences

- **VCI2016 - 14th VIENNA CONFERENCE ON INSTRUMENTATION** | 15-19 FEBRUARY 2016 | VIENNA, AUSTRIA · Oral presentation: Stability monitoring of historical buildings with a cosmic ray tracking system, G. Baronio, G. Bonomi, A. Donzella, F. Fallavolita, R. Nardò, D. Pagano, P. Vitulo, A. Zenoni.
- **MPGD2015 - 4th INTERNATIONAL CONFERENCE ON MICROPATTERN GASEOUS DETECTORS** | 12-15 OCTOBER 2015 | TRIESTE, ITALY. Oral presentation: R&D on a novel Fast Timing Micropattern (FTM) gaseous detector, B.Dorney, I.Vai, P. Vitulo, F.Fallavollita, S. Salva, M. Maggi, S. Franchino, R. de Oliveira, A. Sharma, J.Merlin.
- **SIF2014 - 100th NATIONAL CONGRESS OF THE ITALIAN PHYSICS SOCIETY** | 12-15 SEPTEMBER 2014 | PISA, ITALY. Oral presentation: Sistema di misura per il monitoraggio di stabilità di grandi costruzioni civili tramite l’uso di raggi cosmici, O. Barnabà, G. Baronio, G. Bonomi, A. Donzella, F. Fallavolita, R. Nardò, D. Pagano, I. Vai, P. Vitulo, A. Zenoni.

I, FRANCESCO FALLAVOLLITA, born in POPOLI (PE) on 10/01/1988, resident in Via Silio Italico n.79, CORFINIO (AQ) - Italy, declare under penalty of perjury subject to all applicable laws (art.76 D.P.R. 28/12/2000 n.445), that the information provided is true and correct to the best of my knowledge, information and belief.

I authorize the use of my personal data in compliance with D.L. 196/03.