

ARDENT - ESR3



Silvia Puddu - 13/06/2013

- ↳ About me
- ↳ Experimental activity
 - ↳ n_TOF
 - ↳ CERF
 - ↳ Radioactive waste
- ↳ Training
- ↳ Conferences & Presentations
- ↳ Publications
- ↳ Outreach
- ↳ Secondments

Summary



- ↳ Born in Cagliari-Sardinia Italy
- ↳ ARDENT Project: ESR3
- ↳ Affiliation: CERN
- ↳ PhD affiliation: Bern University
- ↳ Supervisors: M. Silari, F. Murtas

About me



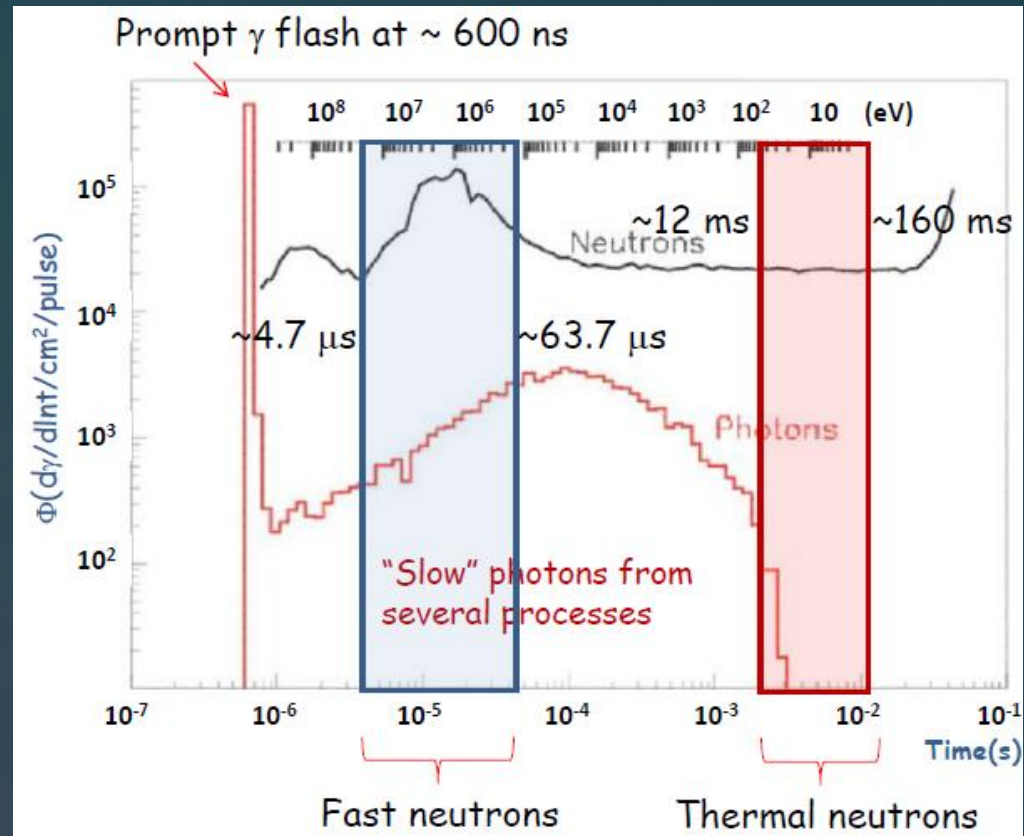
⊗ **n_TOF facility:** neutron production from spallation reactions; a 183 m path define neutron energy from TOF.

⊗ **Two activities with GEM:**

- ⊗ Beam imaging with fast neutron detector
- ⊗ Beam imaging with thermal neutron detector

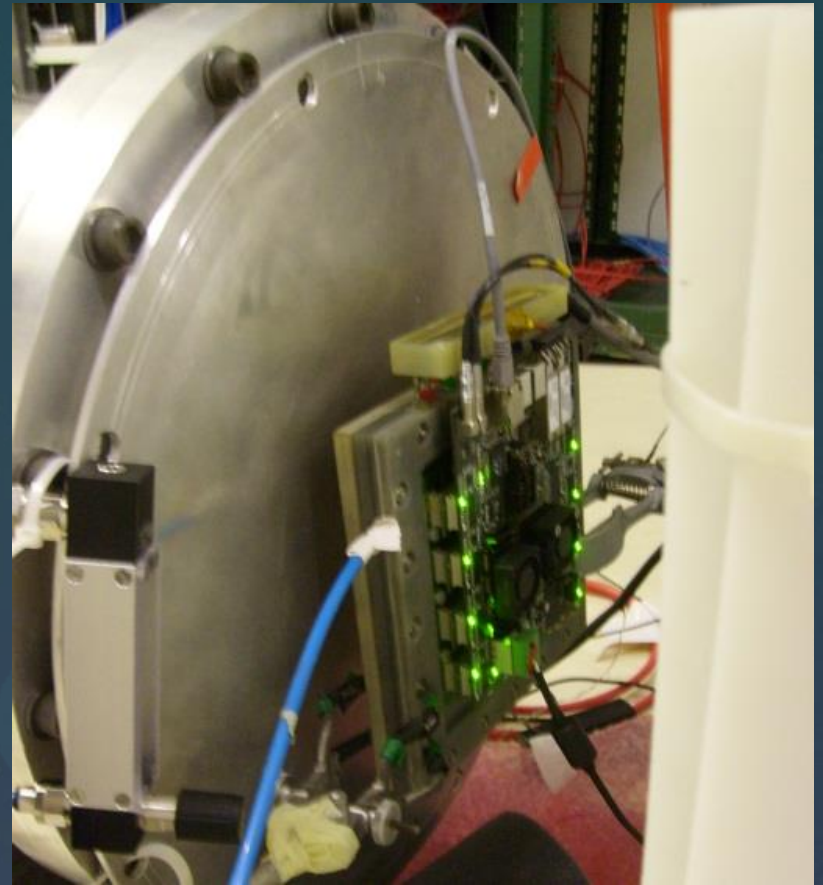
⊗ Neutrons interact with a converter and the generated charged particles are detected by GEM

⊗ Neutron energy is selected by delaying the trigger of the GEM

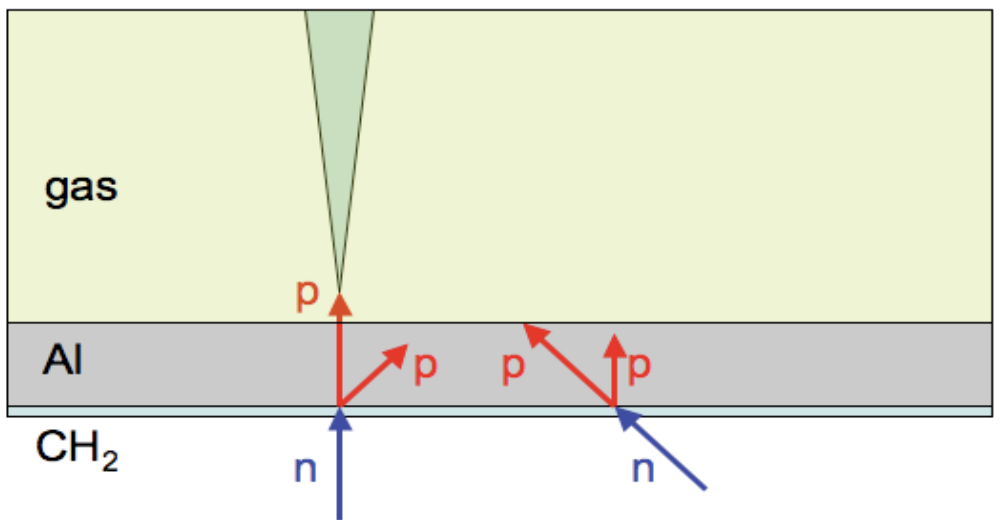


Experimental activity:
n_TOF

- ↳ **n_TOF facility:** neutron production from spallation reactions; a 183 m path define neutron energy from TOF.
- ↳ **Two activities with GEM:**
 - ⌘ Beam imaging with fast neutron detector
 - ⌘ Beam imaging with thermal neutron detector
- ↳ Neutrons interact with a converter and the generated charged particles are detected by GEM
- ↳ Neutron energy is selected by delaying the trigger of the GEM

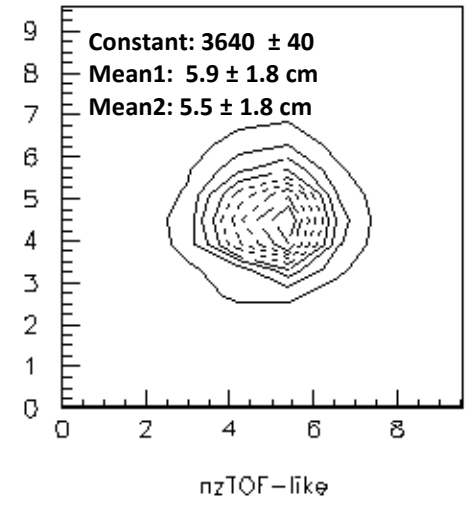
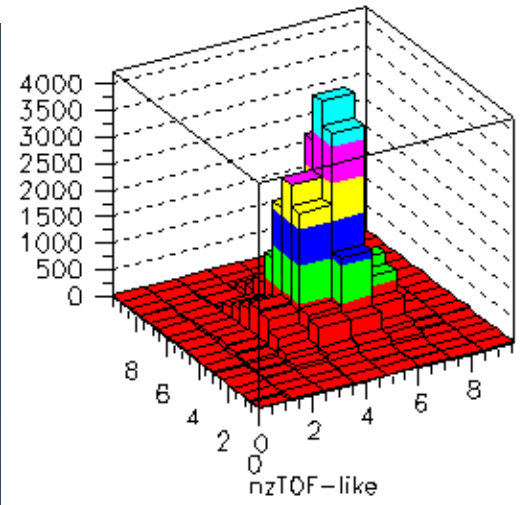


Experimental activity:
n_TOF

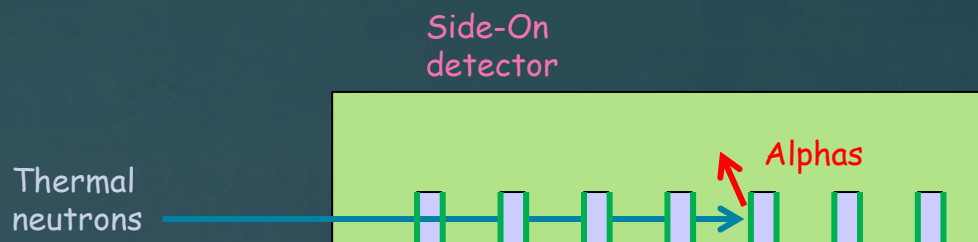


Fast neutrons:

- & Head on detector
- & Converter: PE+Al
- & Delay: 2000 ns
- & Low sensitivity to γ background at chosen WP

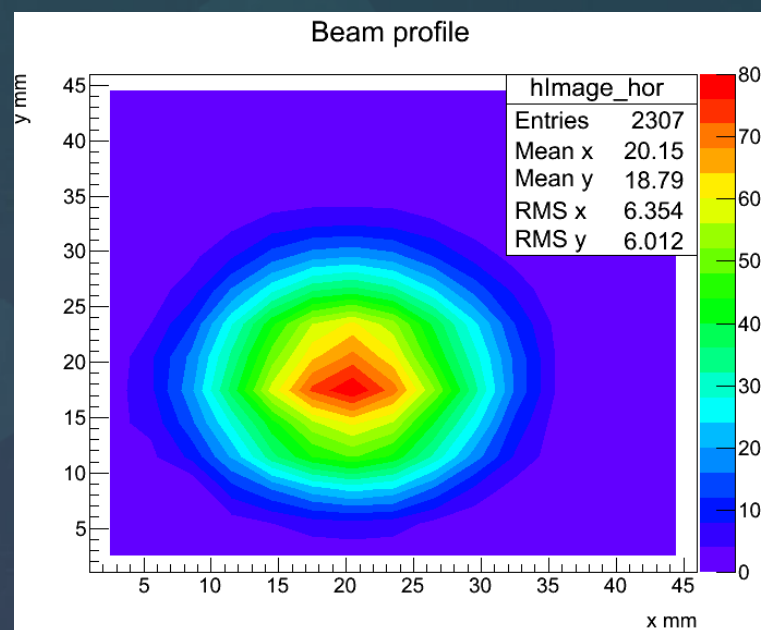


Experimental activity:
n_TOF



Thermal neutrons:

- ⊗ Converter: series of slices of ^{10}Bo
- ⊗ Delay: 12 ms
- ⊗ Low sensitivity to γ background at chosen WP
- ⊗ Beam image reconstructed from several step position
- ⊗ Data analysis performed by E. Aza



Experimental activity:
n_TOF



& CERF facility: neutron production from spallation reaction.

⌘ On the roof, neutron spectrum is similar to aircraft neutron spectrum.

& Activity with GEM:

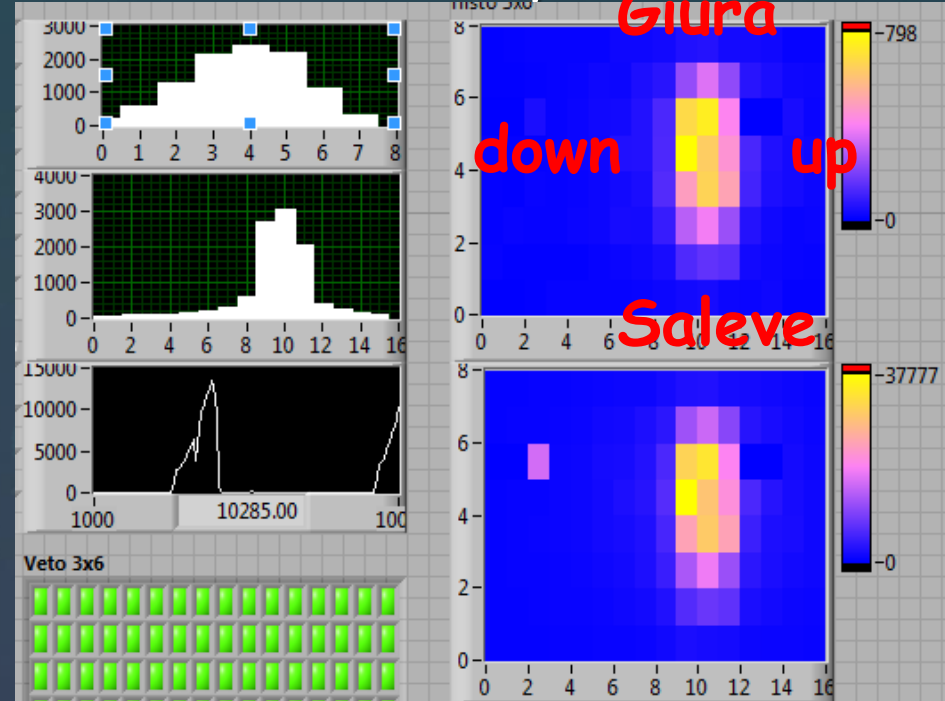
⌘ beam monitoring

⌘ measurements of several radiation components

Experimental activity:
CERF



- GEM for beam monitoring
- & beam shape
- & beam alignment
- & beam intensity

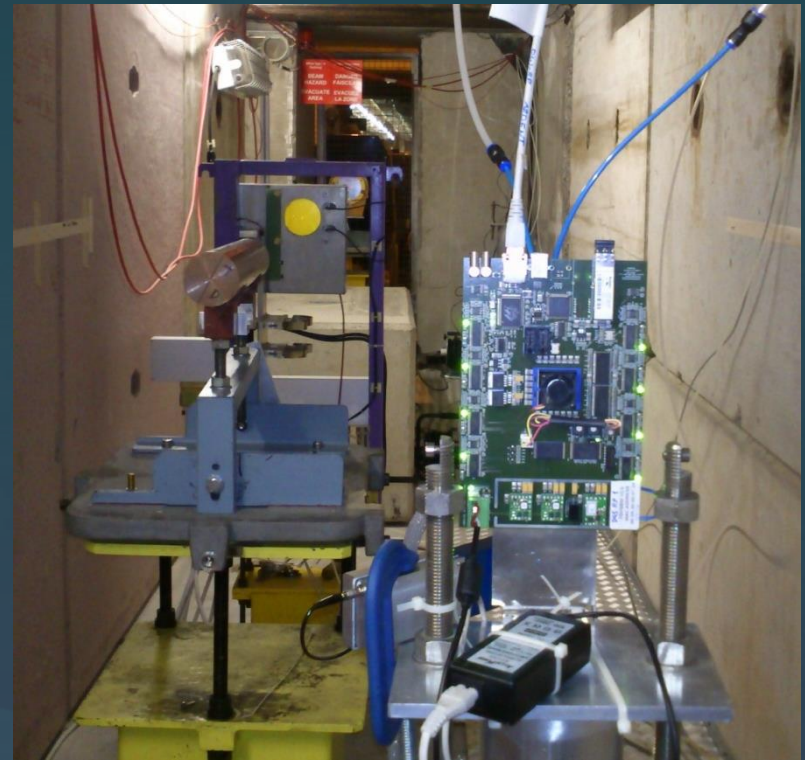
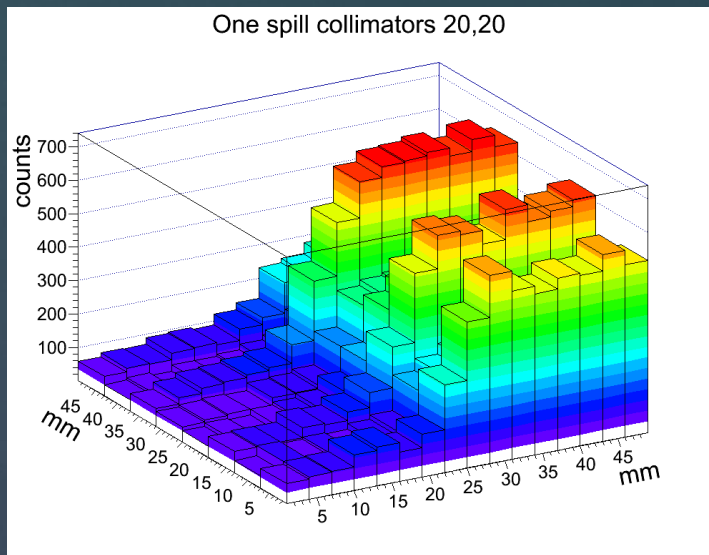


Experimental activity:
CERF

GEM for dosimetry

↳ On December 2012

- ⊗ position at the side of the target
- ⊗ charged component
- ⊗ thermal neutron component
- ⊗ Analysis performed by E. Aza



Experimental activity: CERF

Motivation:

- ⌘ materials in accelerator environment are activated by radiations
- ⌘ in order to treat this materials after the decommissioning, it is necessary a characterization to know the nuclide population
- ⌘ gamma emitters are easily recognised by γ spectrometry
- ⌘ the challenge is to measure the ^{55}Fe amount
- ⌘ a detector with high efficiency to ^{55}Fe and high γ rejection to is needed



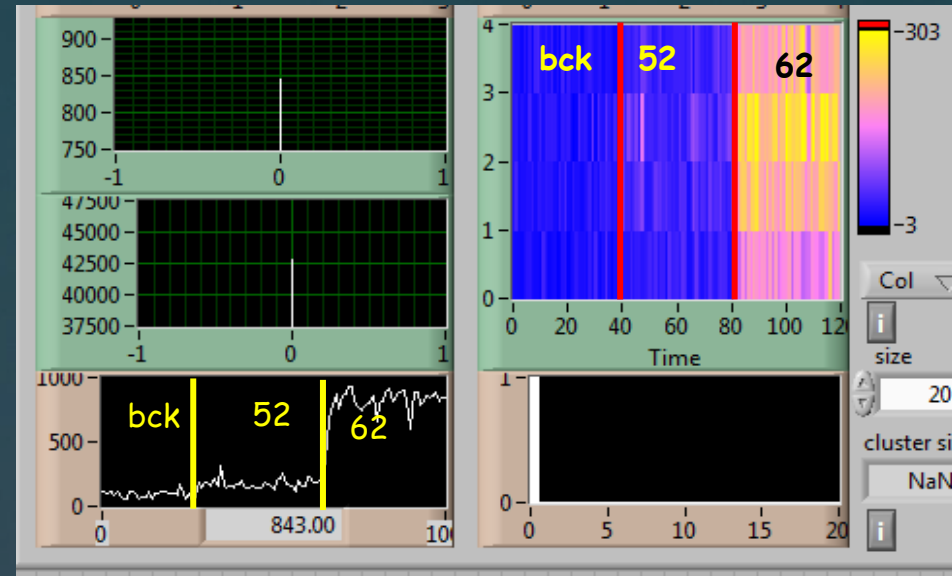
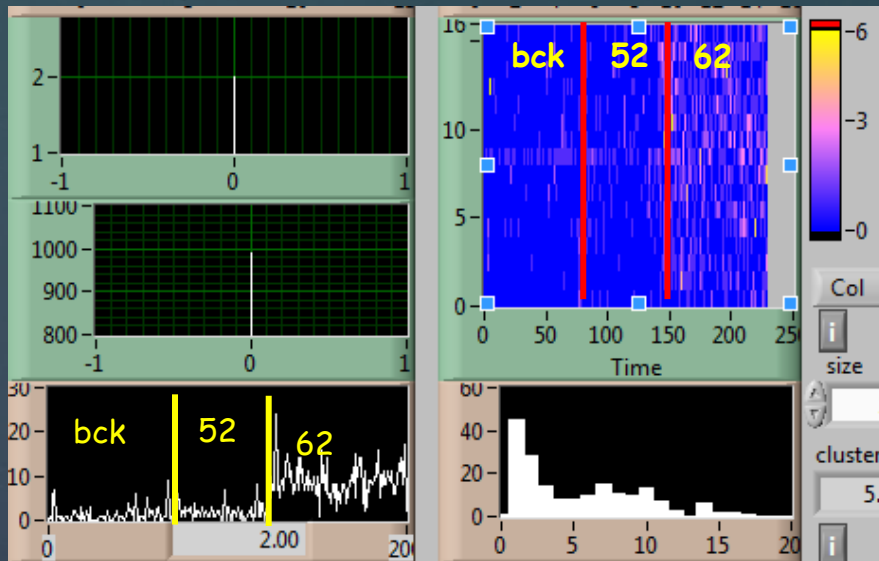
Experimental activity: radioactive waste

Detectors characterization with sources:

- 3 mm drift detector
- 40 mm drift detector:
 - higher efficiency to ^{55}Fe
 - higher γ rejection

Measurements with samples:

- Fully characterised samples with high presence of ^{60}Co



Experimental activity:
radioactive waste

↳ 2012 Q3

- ⌘ Summer English course (CERN)
- ⌘ Advanced FLUKA course (Vancouver)

↳ 2012 Q4

- ⌘ Training on GEM detector (Frascati)
- ⌘ Labview for beginner (CERN)
- ⌘ Radiation detection and measurements (Anaheim)
- ⌘ ARDENT workshop (Wien)

↳ 2013 Q2

- ⌘ Training on FLUKA for ntuple generation (Dresden)

Training

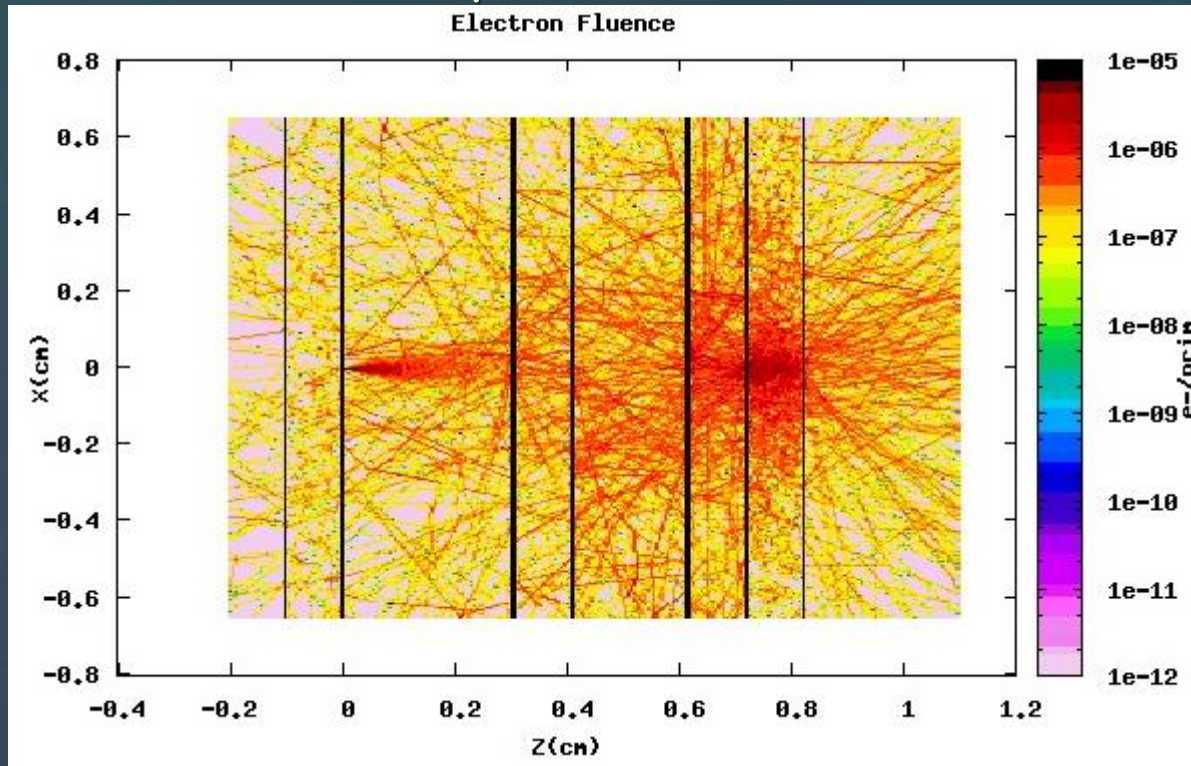
- ⌘ 31^o October 2012: nss-ieee Anaheim "Performance test of triple GEM detector at CERN n_TOF facility"
- ⌘ 2nd November 2012: nss-ieee Anaheim "Investigation on Thermal Neutron Detectors Based on the Gas Electron Multiplier Technology" (on behalf of F. Murtas)
- ⌘ 29^o November 2012: n_TOF annual meeting "Triple GEM detector at CERN n_TOF facility"
- ⌘ 2(3) abstract submitted for next nss-ieee:
 - ⌘ The Triple GEM detector as beam monitor at the CERF facility (co-author)
 - ⌘ Neutron beam profile measurements with a triple GEM for thermal neutrons at the CERN n_TOF facility (first author)

Conferences & Presentations

- ⌘ G. Claps, G. Croci, F. Murtas, A. Pietropaolo, S. Puddu, C. T. Severino, M. Silari, "Performance Test of a Triple GEM Detector at CERN n_TOF Facility", published in conference proceeding IEEE-NSS Anaheim 29 Oct - 3 Nov 2012: [ARDENT-CONF-2012-001](#).
- ⌘ O. Sauter, B.P. Duval, L. Federspiel, F. Felici, T.P. Goodman, A. Karpushov, S. Puddu, J. Rossel and TCV team, "Effects of ECH/ECCD on tearing modes in TCV and link to rotation profile", [EPFL-CONF-153089\(2010\)](#).
- ⌘ B. Esposito, F. Murtas, R. Villari, M. Angelone, D. Marocco, P. Pillon and S. Puddu, "Design of a GEM-based detector for the measurement of fast neutrons", Nuclear Instruments and Methods, [doi:10.16/j.nima.2009.06.101\(2009\)](#).

Publications

⊗ In April 2013 I spent a week in Dresden at HZDR to develop a tool for FLUKA in order to generate ntuple. The aim of this activity is to characterize the phenomena into the detector, event by event, to optimize it



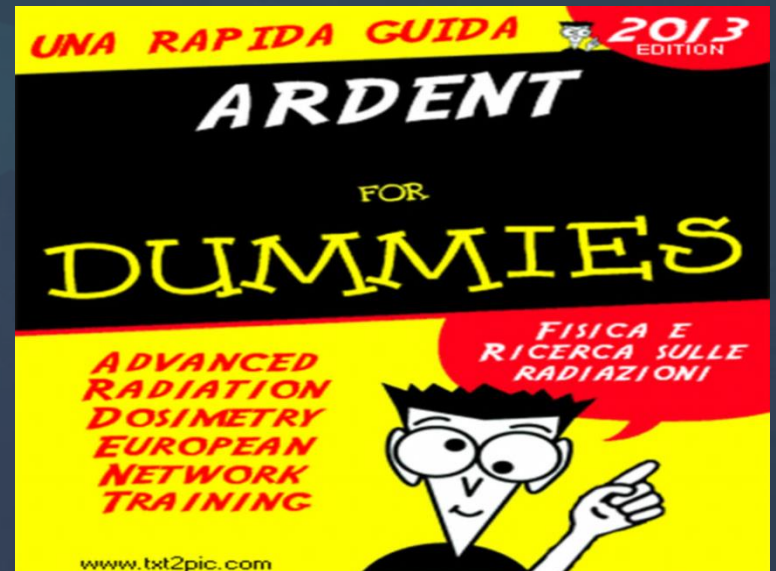
Secondments

In May 2013 I have done the seminars, titled "ARDENT for Dummies", in three schools of my city (Cagliari, Sardinia-Italy), for the students of 4th and 5th years: the two branches of "Istituto Tecnico e Liceo Scientifico delle Scienze Applicate M. Giua" and the "Liceo Scientifico L. B. Alberti". The presentation was focused on the ARDENT project, with an introduction to radiation and dosimetry:

- ↳ <http://youtu.be/3wtUr3iVVIw?t=1m04s> (video about CERN)
- ↳ Why doing research?
- ↳ Radioactivity
- ↳ Interaction between radiation and material
- ↳ ARDENT
 - ↳ Dosimetry
 - ↳ Detector for neutrons dosimetry
 - ↳ Hadrontherapy
 - ↳ Beam monitoring

All seminars were about 1h30 for ~70. Students were really interested and some of them is thinking about Physics for University study.

Outreach





Thanks!!!