ARDENT -ESR3

Silvia Puddu - 14/10/2013

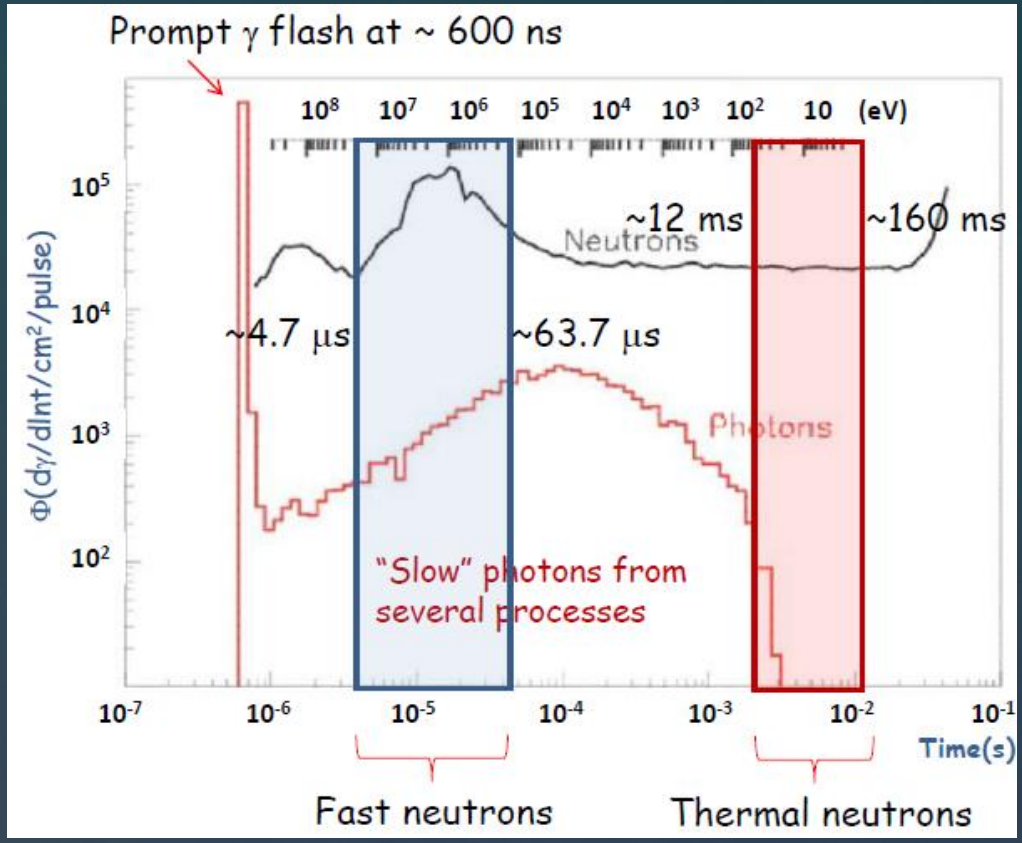
Summary

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

- 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

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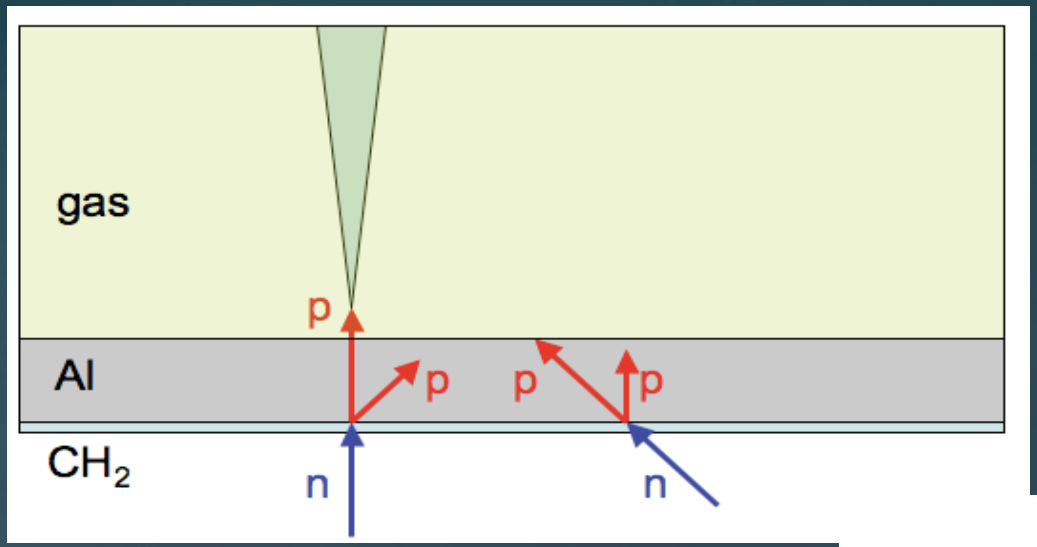
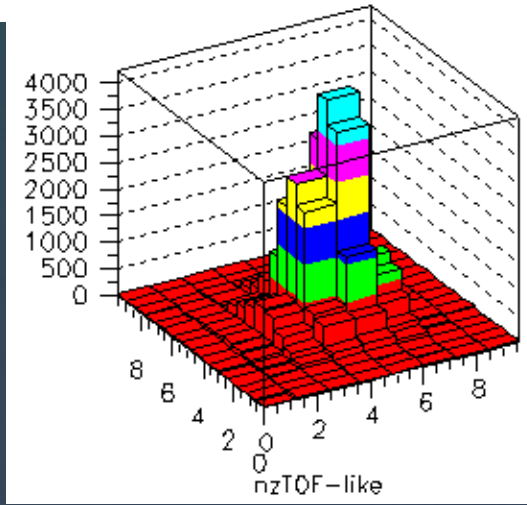
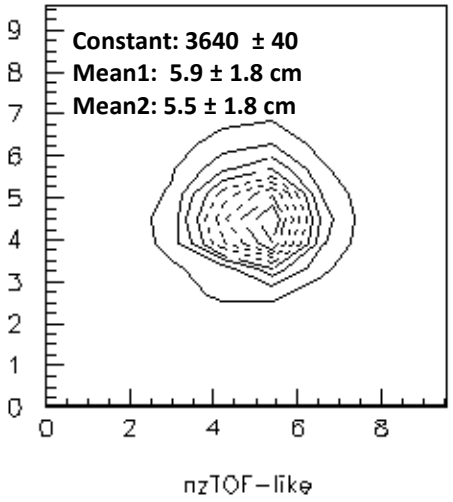
Experimental activity: n_TOF



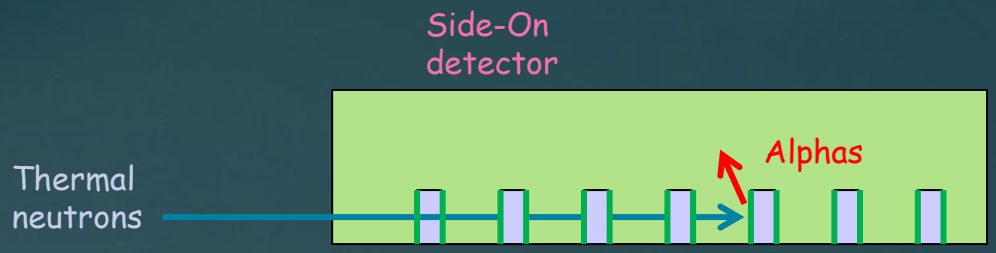
Fast neutrons:

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



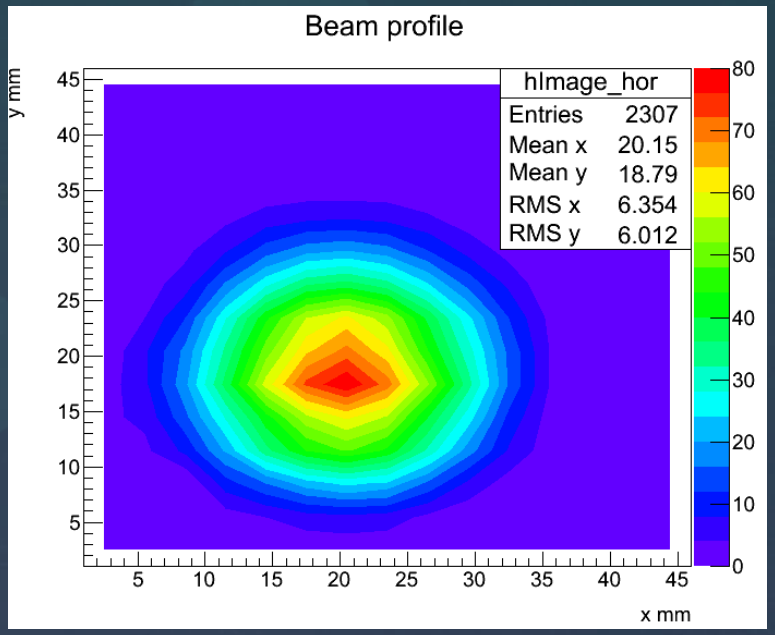


Experimental activity: n_TOF



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
- Writing paper
- IEEE-NSS 2013, Seoul - Talk



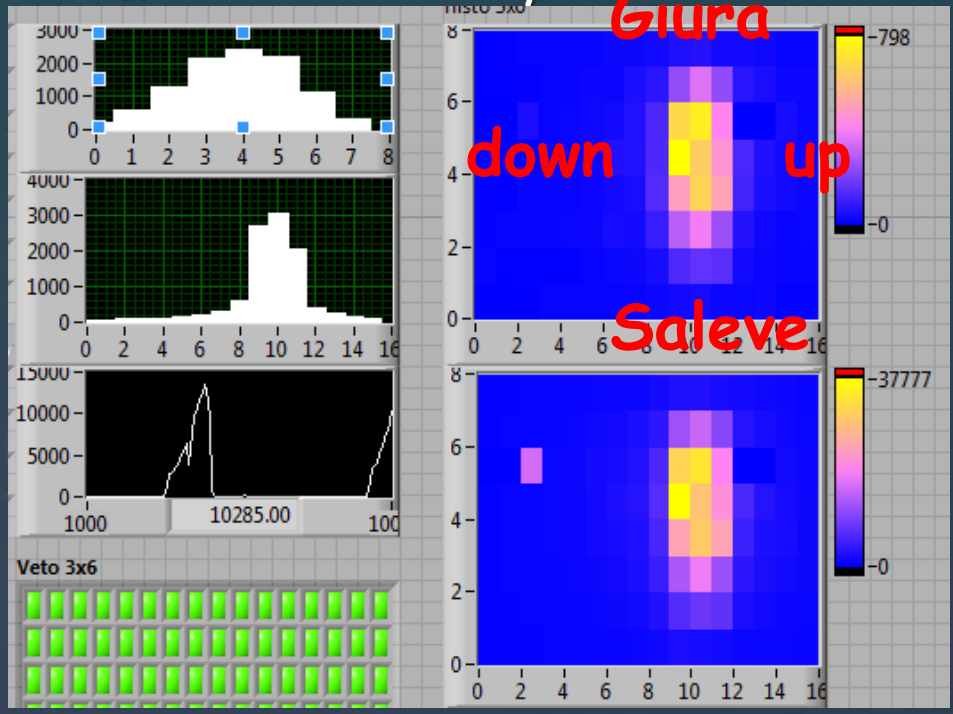
Experimental activity: n_TOF

- CERF facility: neutron production from spallation reaction.
  - On the roof, neutron spectrum is similar to aircraft neutron spectrum.
- Activity with GEM:
  - beam monitoring
  - measuremets of several radiation components

Experimental activity: CERF

GEM for beam monitoring

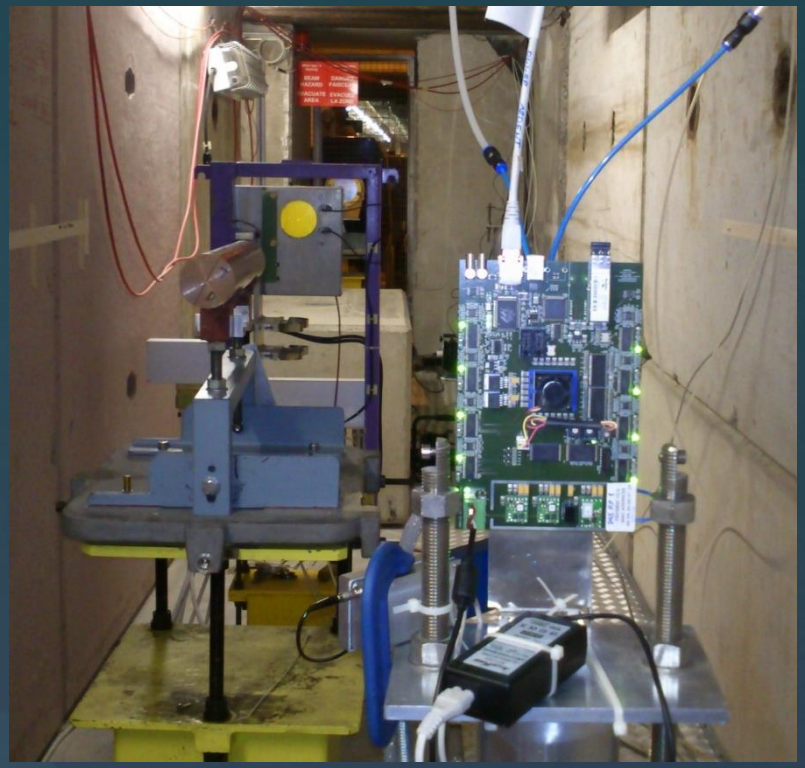
- beam shape
- beam alignment
- beam intensity

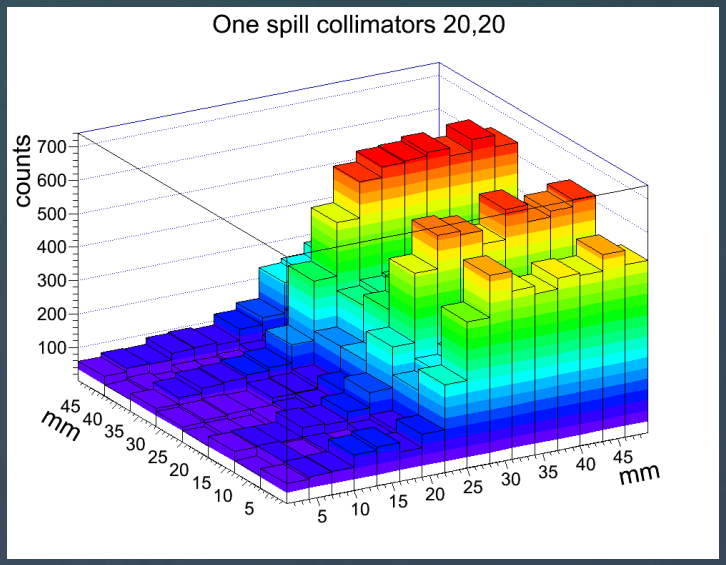


Experimental activity: CERF

GEM for dosimetry

- On December 2012
  - position at the side of the target
  - charged component
  - thermal neutron component
  - Analysis performed by E. Aza

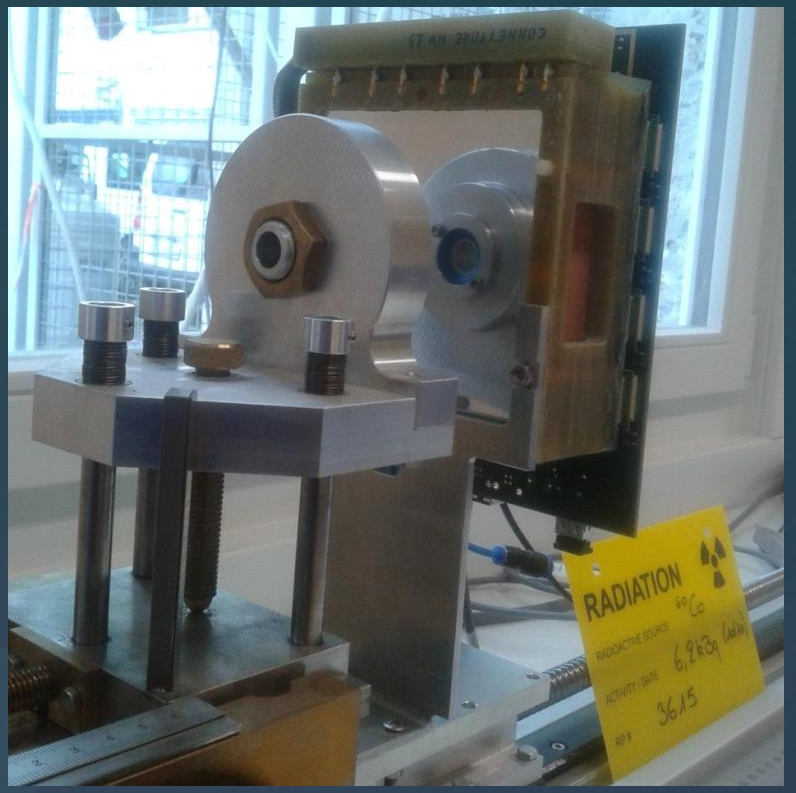




Experimental activity: CERF

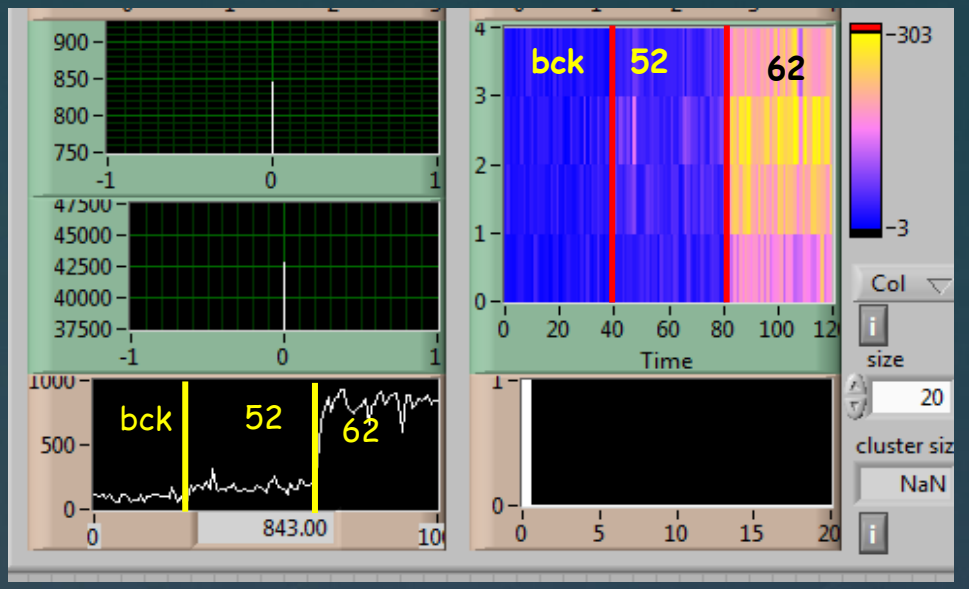
Motivation:

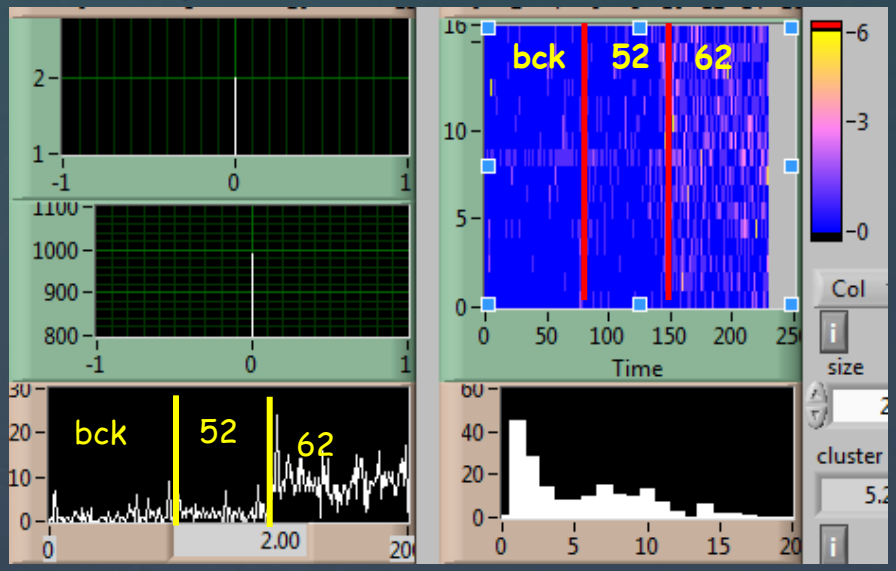
- materials in accelerator environment are activated by radiations
- in order to treat this materials after the decommissioning, it is necessary a characterization to know the nuclide population
- gamma emitters are easily recognised by γ spectrometry
- the challenge is to measure the ^{55}Fe amount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

Conferences & Presentations

- 31th 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)
- 29th November 2012: n_TOF annual meeting "Triple GEM detector at CERN n_TOF facility"
- 3 abstract submitted for next nss-ieee:
  - The Triple GEM detector as beam monitor at the CERF facility (co-author) – Accepted as Poster
  - Neutron beam profile measurements with a triple GEM for thermal neutrons at the CERN n_TOF facility (Reference author) – Accepted as talk
  - ^{55}Fe Measurements in Radioactive Waste with a Triple GEM Detector (Reference author) – Accepted as talk

Publications

- 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.

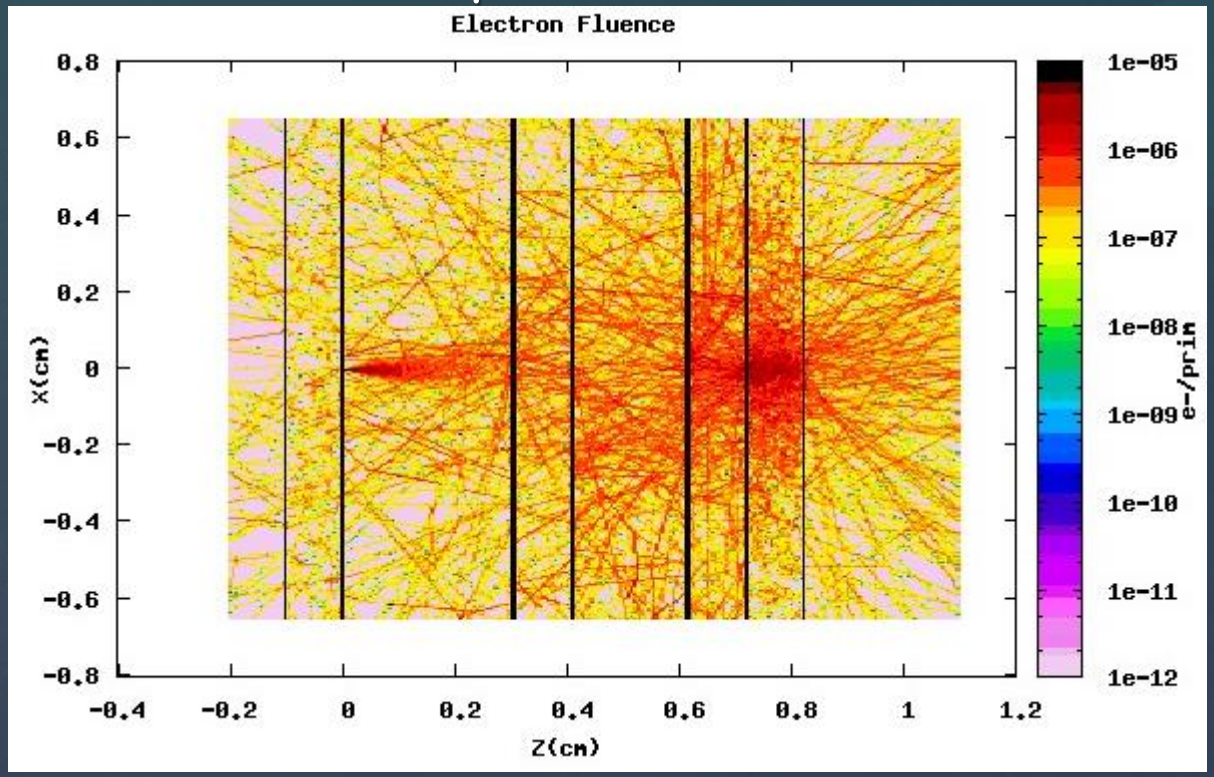
- O. Sauter, B.P. Duval, L. Federspiel, F. Felici, T.P. Goodman A. Karpushov, **S. Puddu**, J. Rossel and TCV team, "Effects of ECH/ECCD on tearing modes in TCV and link to rotation profile", EPFL-CONF-153089(2010).

- 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) .

Training

- 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)
  - Preparation of Mid-Term review (CERN)
- 2013 Q3
  - Management of Radioactive Waste in Nuclear Power Plant
  - Course for written English (started now-CERN)
  - First Aid course (programmed-CERN)

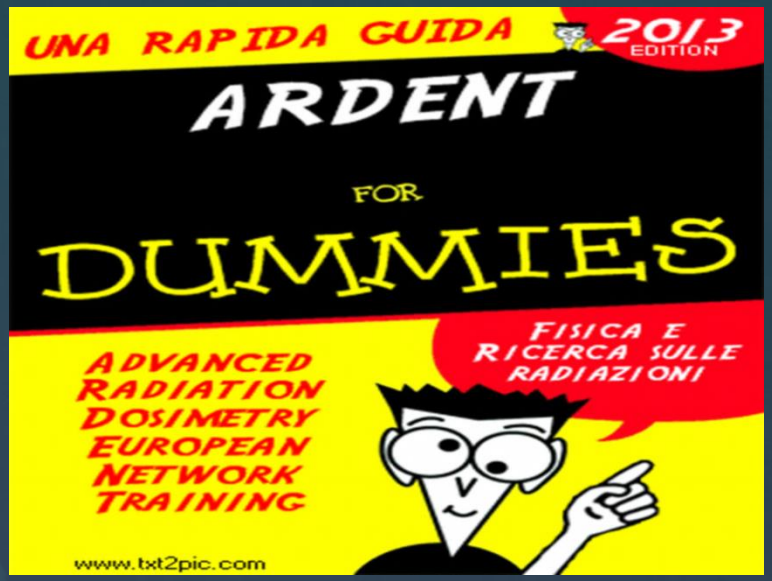
- In April 2013 I spent a week in Dresden at HZDR to develop a tool for FLUKA in order to generate ntuple. The aim of this activity is to characterize the phenomena into the detector, event by event, to optimize it



Training

- May 2013 Cagliari-Sardinia, three high schools: "ARDENT for Dummies"
  - http://youtu.be/3wtUr3iVVIw?t=1m04s (video about CERN)
  - Why doing research?
  - Radioactivity
  - Interaction between radiation and material
  - ARDENT
    - Dosimetry
      - Detector for neutrons dosimetry
    - Hadronherapy
      - Beam monitoring

  All seminars were about 1h30 for ~70. Students were really interested and some of them is thinking about Physics for University study. This seminar is going to be repeated in a shorter version for the Outreach Event in Milan for the 150 anniversary of the Politecnico.



- 27th of October 2013: "Origin 2013 – European Researcher's Night Event". I have taken part on the speed dating (short meeting face to face)

- 28th of October 2013: "CERN Open Days". I have been involved in the RP stand as a guide, I have explained to the public about radiation, natural background, detectors, safety. I have prepared the presentation "Radiation protection for Dummies" for the RP group

Outreach

- From January to May 2013: as IEEE student member, I did a review for a paper of IEEE journal

- 2013: I managed the work for a new laboratory for our section, RP-SP at CERN

Miscellaneous...


CERN
ARDENT
Advanced Radiation Dosimetry European Network Training
MARIE CURIE ACTIONS
b
UNIVERSITÄT
BERN

Thanks!!!