

2nd Annual ARDENT Workshop & ARDENT MidTerm Review



Report of Contributions

Contribution ID: 5

Type: **not specified**

ITN Management Office

Wednesday 16 October 2013 13:30 (1h 30m)

Presenters: CELL, Juan Carlos (IBA); SILARI, Marco (CERN); ROLLET, Sofia (AIT- Austrian Institute of Technology); STANISLAV, Vladimir (Jablotron Alarms a.s.)

Session Classification: ARDENT Board Meetings

Contribution ID: 6

Type: **not specified**

ARDENT Supervisory Board

Wednesday 16 October 2013 15:00 (1h 30m)

Presenters: ROZENFELD, Anatoly (University of Wollongong); WAKER, Anthony (university of Ontario); PARRAVICINI, Antonio (M); Prof. PINSKY, Lawrence (University of Houston (US)); SILARI, Marco (CERN); MAZZILLO, Massimo (STMicroelectronics); Dr BECK, Peter (AIT-Seibersdorf Laboratories); ROLLET, Sofia (AIT- Austrian Institute of Technology); Dr POSPISIL, Stanislav (Institute of Experimental and Applied Physics, Czech Technical University in Prague); AGOSTEO, Stefano (Politecnico di Milano); GEORGE, Stuart Patrick; MICHEL, Thilo (University of Erlangen); MOLLENHAUER, Uwe (IBA); CONTE, Valeria (INFN Legnaro National Laboratories); STANISLAV, Vladimir (Jablotron Alarms a.s.)

Session Classification: ARDENT Board Meetings

Contribution ID: **18**

Type: **not specified**

Benvenuto / Welcome introduction

Wednesday 16 October 2013 09:30 (15 minutes)

Presenters: SILARI, Marco (CERN); AGOSTEO, Stefano (Politecnico di Milano)

Session Classification: Outreach Day “MISURARE LE RADIAZIONI: UN ASPETTO FONDAMENTALE NELLA PRATICA MEDICA, INDUSTRIALE, NELLA RICERCA E NEL PROGRESSO AEROSPAZIALE”

Contribution ID: 19

Type: **not specified**

Il programma ARDENT della Unione Europea / The ARDENT European Union project

Wednesday 16 October 2013 09:45 (45 minutes)

Primary author: SILARI, Marco (CERN)

Presenter: SILARI, Marco (CERN)

Session Classification: Outreach Day “MISURARE LE RADIAZIONI: UN ASPETTO FONDAMENTALE NELLA PRATICA MEDICA, INDUSTRIALE, NELLA RICERCA E NEL PROGRESSO AEROSPAZIALE”

Contribution ID: 20

Type: **not specified**

ARDENT per tutti / Ardent for all

Wednesday 16 October 2013 10:30 (30 minutes)

Presenter: PUDDU, Silvia (Universitaet Bern (CH))

Session Classification: Outreach Day “MISURARE LE RADIAZIONI: UN ASPETTO FONDAMENTALE NELLA PRATICA MEDICA, INDUSTRIALE, NELLA RICERCA E NEL PROGRESSO AEROSPAZIALE”

Contribution ID: 21

Type: **not specified**

**Incontri con i ricercatori ARDENT e dimostrazione
delle attività di ricerca / Meetings with ARDENT
researchers and presentations of the scientific
activities**

Wednesday 16 October 2013 11:00 (1h 30m)

Session Classification: Outreach Day “MISURARE LE RADIAZIONI: UN ASPETTO FONDAMENTALE NELLA PRATICA MEDICA, INDUSTRIALE, NELLA RICERCA E NEL PROGRESSO AEROSPAZIALE”

Contribution ID: 22

Type: **not specified**

Discussion on M5/M6 milestones

Tuesday 15 October 2013 13:30 (45 minutes)

Presenters: SILARI, Marco (CERN); CARESANA, marco (Politecnico di Milano)

Session Classification: Roundtable discussion

Contribution ID: 23

Type: **not specified**

Rehearsal of ESR talks at the IEEE Dosimetry Workshop

Tuesday 15 October 2013 14:15 (1h 30m)

Session Classification: Roundtable discussion

Contribution ID: 24

Type: **not specified**

Discussion on the organization of the course on Business and Administration and secondments to private partners

Tuesday 15 October 2013 16:15 (30 minutes)

Session Classification: Roundtable discussion

Contribution ID: 25

Type: **not specified**

WP4 measurement campaigns

Tuesday 15 October 2013 16:45 (1 hour)

Presenters: SILARI, Marco (CERN); MAGISTRIS, Matteo (CERN)

Session Classification: Roundtable discussion

Contribution ID: 26

Type: **not specified**

ARDENT Training Board

Tuesday 15 October 2013 09:00 (1h 15m)

Presenters: FAZZI, Alberto; PARRAVICINI, Antonio (M); JAKUBEK, Jan (Czech Technical University (CZ)); CELL, Juan Carlos; HUBNER, Pavel (Jablotron); BECK, Peter (Seibersdorf Laboratories); FROESCHL, Robert (CERN); ROLLET, Sofia (AIT- Austrian Institute of Technology)

Session Classification: ARDENT Board Meetings

Contribution ID: 28

Type: **not specified**

ARDENT Technical Training Board

Tuesday 15 October 2013 10:45 (1h 15m)

Presenters: MAGISTRIS, Matteo (CERN); ROLLET, Sofia (AIT- Austrian Institute of Technology); VYKYDAL, Zdenek (Czech Technical University (CZ)); CARESANA, marco (Politecnico di Milano)

Session Classification: ARDENT Board Meetings

Contribution ID: 29

Type: **not specified**

ARDENT Dissemination and Outreach Board

Tuesday 15 October 2013 13:30 (1h 30m)

Presenters: LATOCHA, Marcin (AIT Austrian Institute of Technology GmbH); CAMPBELL, Michael (CERN); LERCH, Michael (University of Wollongong); ROLLET, Sofia (AIT- Austrian Institute of Technology); Dr POSPISIL, Stanislav (Institute of Experimental and Applied Physics, Czech Technical University in Prague); STANISLAV, Vladimir (Jablotron Alarms a.s.); CARESANA, marco (Politecnico di Milano)

Session Classification: ARDENT Board Meetings

Contribution ID: **30**

Type: **not specified**

ARDENT per tutti / Ardent for all

Wednesday 16 October 2013 14:30 (30 minutes)

Presenter: PUDDU, Silvia (CERN)

Session Classification: Outreach Day “MISURARE LE RADIAZIONI: UN ASPETTO FONDAMENTALE NELLA PRATICA MEDICA, INDUSTRIALE, NELLA RICERCA E NEL PROGRESSO AEROSPAZIALE”

Contribution ID: 39

Type: **not specified**

Welcome & Introduction

Monday 14 October 2013 10:45 (15 minutes)

Short introduction by the Research Executive Agency Representative and the Coordinator.

Summary

Short introduction by the Research Executive Agency Representative and the Coordinator

Presenters: SILARI, Marco (CERN); LEVONEN, Mika

Session Classification: ARDENT Midterm review

Contribution ID: 40

Type: **not specified**

Tour de table

Monday 14 October 2013 11:00 (40 minutes)

Each supervisor from each Institute should briefly present (5 min) their research team and describe their role within the network.

Session Classification: ARDENT Midterm review

Contribution ID: 41

Type: **not specified**

ARDENT Project Overview

Monday 14 October 2013 11:40 (50 minutes)

A presentation by the Coordinator on the Network and the Mid-Term Review Report. The presentation cover scientific, training and networking topics.

Primary author: SILARI, Marco (CERN)

Presenter: SILARI, Marco (CERN)

Session Classification: ARDENT Midterm review

Contribution ID: 42

Type: **not specified**

ESR 1 presentation - CERN

Monday 14 October 2013 14:00 (15 minutes)

Primary author: AZA, Eleni (CERN)

Presenter: AZA, Eleni (CERN)

Session Classification: ARDENT Midterm review

Contribution ID: 43

Type: **not specified**

ESR 8 presentation - CTU

Monday 14 October 2013 16:15 (15 minutes)

Primary author: LOO, Kevin

Presenter: LOO, Kevin

Session Classification: ARDENT Midterm review

Contribution ID: 44

Type: **not specified**

Introductory lecture on microdosimetry

Thursday 17 October 2013 09:00 (1 hour)

1. The energy transfer points
2. The single-event energy imparted
3. Single-event microdosimetric quantities
4. Multi-event microdosimetric quantities
5. Micro and macro dosimetry
6. From micro-to-macro dosimetry for low and high LET radiations.

Primary author: Dr COLAUTTI, Paolo (LNL INFN)

Presenter: Dr COLAUTTI, Paolo

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 45

Type: **not specified**

Gas detectors for microdosimetry

Thursday 17 October 2013 10:00 (1 hour)

FUNDAMENTALS

- Gas ionization
- Charge collection
- Cavity chambers

GAS DETECTORS for MICRODOSIMETRY

- Ionization Chambers
 - o Variance method
 - o Recombination Chambers
- Proportional Counters
 - o Principles of Operation
 - o Tissue Equivalent Proportional Counters (TEPC)
 - o TEPC Properties and Applications
 - o Multi-element TEPCs
 - o Heterogeneous Counters
 - o Wall-Less Counters

FUTURE NEEDS and CHALLENGES

- Size and sensitivity
- Neutron-Charge particle discrimination
- Calibration
- Signal Processing

Summary

Gas detectors remain the most common and the most used of all detector types in experimental microdosimetry. This lecture aims to provide the basis for understanding gas detector operation and to illustrate their application in microdosimetry and radiation measurement science. The discussion will conclude with a review of future needs and current technical challenges.

Primary author: Dr WAKER, Anthony (UOIT)

Presenter: Dr WAKER, Anthony

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 46

Type: **not specified**

Quality assessment of hadrontherapy fields with TEPCs

Thursday 17 October 2013 11:30 (1 hour)

1. Mini TEPC design and construction
2. Vacuum and gas flow
3. The electronic chain
4. Mini TEPC energy calibration
5. Data processing
6. Therapeutic proton-beam qualities
7. BNCT radiation-field qualities

Primary author: Dr COLAUTTI, Paolo (LNL INFN)

Presenter: Dr COLAUTTI, Paolo (LNL INFN)

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 47

Type: **not specified**

Principle of Silicon based microdosimetry

Thursday 17 October 2013 14:00 (1 hour)

Silicon detectors are being studied as microdosimeters since they can provide sensitive volumes of micrometric dimensions. They can be applied for assessing single event effects in electronic instrumentation exposed to complex fields around high-energy accelerators or in space missions. When coupled to tissue-equivalent converters, they can be used for measuring the quality of radiation therapy beams or for dosimetry. The use of micrometric volumes avoids the contribution of wall effects to the measured spectra. Further advantages of such detectors are their compactness, cheapness, transportability and a low sensitivity to vibrations. Anyway, the following problems should be solved when a silicon device for microdosimetry: i) the sensitive volume has to be confined in a region of well-known dimensions; ii) the electric noise limits the minimum detectable energy; iii) corrections for tissue-equivalency should be made; iv) corrections for shape equivalency should be made when referring to a spherical simulated site of tissue; v) the angular response should be evaluated carefully; vi) the efficiency of a single detector of micrometric dimensions is very poor and detector arrays should be considered. Several devices are being proposed as silicon microdosimeters, based on different technologies (telescope detectors, silicon on insulator detectors and arrays of cylindrical p-n junctions with internal amplifications), in order to satisfy the issues mentioned above.

Primary authors: POLA, Andrea (Politecnico di Milano); AGOSTEO, Stefano (Politecnico di Milano)

Presenters: POLA, Andrea (Politecnico di Milano); AGOSTEO, Stefano (Politecnico di Milano)

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 48

Type: **not specified**

Silicon microdosimetry

Thursday 17 October 2013 15:00 (1 hour)

1. Introduction to Solid State microdosimetry
 2. Electronic , calibration and sensitivity of Si microdosimeter
 - 2.1. Comparison of TEPC to Si-microdosimeter
 3. Concept and design of Silicon on Insulator (SOI) microdosimeters
 - 3.1. Three generation of SOI microdosimeters
 - 3.2. Charge collection in Sensitive Volumes (SV) of SOI microdosimeters
 4. Application of SOI microdosimeters
 - 4.1. Radiation protection (Cf-252 and Pu-Be Sources)
 - 4.2. Hadron Therapy
 - 4.2.1. Fast Neutron Therapy (FNT)
 - 4.2.2. Proton Therapy (PT)
 - 4.2.3. Heavy Ion Therapy (HIT)
 - 4.2.4. LEM vs MKM –SOI microdosimetry experience
1. 3D detector technology-future of Si microdosimetry.
 - 5.1. Peculiarities of charge collection in 3D Si detectors
 - 5.2. Concept and design of 3D Si microdosimeter.
 - 5.3. GEANT 4 modeling of 3D microdosimeter (avionics environment, isotopic neutron sources)
 2. Other Si microdosimetric structures (DRAM , FG MOSFET etc)
 3. Conclusion and tips for thinking on new Si microdosimeters design

Primary author: Prof. ROZENFELD, Anatoly (UOW)

Presenter: Prof. ROZENFELD, Anatoly (UOW)

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 49

Type: **not specified**

A monolithic silicon telescope for solid state microdosimetry

Thursday 17 October 2013 16:30 (1 hour)

1. The detection system: features, advantages and drawbacks.
2. Microdosimetry of neutron fields: numerical studies and experimental characterizations.
3. Quality assessment of clinical proton beams: microdosimetric characterization and direct comparison with TEPCs.
4. Microdosimetry of carbon beams: preliminary tests.
5. A silicon microdosimeter integrated into a nanodosimeter.

Primary author: POLA, Andrea (Politecnico di Milano)

Presenter: POLA, Andrea (Politecnico di Milano)

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 50

Type: **not specified**

From microdosimetry to nanodosimetry

Friday 18 October 2013 09:00 (1 hour)

Radiation-induced damage to living cells or genes is governed, to the greater part, by the pattern of inelastic interactions of ionizing particles in sub-cellular targets (segments of the DNA, nucleosomes, or segments of the chromosome fibre). In consequence, the effectiveness and quality of ionizing radiation should be defined more in terms of quantities which are directly related to the track structure of ionizing radiation than in terms of macroscopic quantities like absorbed dose and linear energy transfer (LET). At the same time, these quantities should be measurable by physical means.

To tackle this challenge to radiation metrology, a track-structure based concept of radiation damage has been developed assuming that the initial damage to nanometre-sized volumes like the DNA is mainly due to the number of ionizing processes of single particles within a target volume or in its near neighbourhood. This number of particle interactions (the so-called ionization-cluster size) is measurable in gases using single-ion or single-electron counting techniques, and serves as a measure of the degree of radiation damage; the corresponding cluster-size frequency then serves as a measure of the radiation-induced damage probability. Radiation damage is described, therefore, in terms of particle interaction probabilities in nanometric volumes (nanodosimetry) instead of micrometric volumes (microdosimetry). In this way the traditional description of radiation damage in terms of LET and absorbed dose is exchanged by a probabilistic description of cluster-size formation which characterizes the interaction pattern of ionizing radiation in nanometric volumes and, thus, the particles' track structure.

To check the validity of the track-structure-based concept of radiation quality, experimental radiobiological data are compared with nanodosimetric quantities derived from cluster-size frequencies calculated by Monte Carlo simulations for ionizing particles at different radiation qualities assuming nanometre-sized liquid-water targets as substitutes of short segments of the DNA. This comparison shows a clear relation between track-structure-based nanodosimetric quantities and radiobiological data, which can also be expected if ionization-cluster-size frequencies are measured in gaseous target volumes filled, for instance, with molecular nitrogen or propane at low gas pressure.

Primary author: Prof. GROSSWENDT, Bernd (PTB (retired))

Presenter: Prof. GROSSWENDT, Bernd (PTB (retired))

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 51

Type: **not specified**

THE STARTRACK EXPERIMENT - Nanodosimetric Structure of hAdRon TRACKS

Friday 18 October 2013 10:00 (1 hour)

GENERALITIES OF TRACK STRUCTURE

THE EXPERIMENTAL SET UP

- The rationale of the experiment
- The measuring procedure

DATA ACQUISITION AND DATA ANALYSIS

- How to handle experimental data

RESULTS

- Some interesting features of the track structure of light ions
- The link to radiobiology

Primary author: Dr CONTE, Valeria (LNL INFN)

Presenter: CONTE, Valeria

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 52

Type: **not specified**

Microdosimetry with GEM and GEM-PIX

Friday 18 October 2013 11:30 (1 hour)

Primary author: Dr MURTAS, Fabrizio (Istituto Nazionale Fisica Nucleare (IT))

Presenter: Dr MURTAS, Fabrizio (Istituto Nazionale Fisica Nucleare (IT))

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 53

Type: **not specified**

Practical training on TEPCs

Friday 18 October 2013 14:00 (4 hours)

Primary authors: Dr MORO, Davide (LNL INFN); Dr COLAUTTI, Paolo (LNL INFN)

Presenters: Dr MORO, Davide (LNL INFN); Dr COLAUTTI, Paolo (LNL INFN)

Session Classification: Training Courses on Experimental Micro- and Nano-dosimetry

Contribution ID: 54

Type: **not specified**

Meeting between the Fellows and the Research Executive Agency Representative

Tuesday 15 October 2013 09:00 (3 hours)

Session Classification: ARDENT Midterm review

Contribution ID: 55

Type: **not specified**

ESR 2 presentation - CERN

Monday 14 October 2013 14:15 (15 minutes)

Primary author: FROJD, Erik (Mittuniversitetet (SE))

Presenter: FROJD, Erik (Mittuniversitetet (SE))

Session Classification: ARDENT Midterm review

Contribution ID: 56

Type: **not specified**

ESR 3 presentation - CERN

Monday 14 October 2013 14:30 (15 minutes)

Primary author: PUDDU, Silvia (CERN)

Presenter: PUDDU, Silvia (CERN)

Session Classification: ARDENT Midterm review

Contribution ID: 57

Type: **not specified**

ESR 4 presentation - CERN

Monday 14 October 2013 14:45 (15 minutes)

Primary author: GEORGE, Stuart Patrick (CERN)

Presenter: GEORGE, Stuart Patrick (CERN)

Session Classification: ARDENT Midterm review

Contribution ID: 58

Type: **not specified**

ESR 5 presentation - SL

Monday 14 October 2013 15:00 (15 minutes)

Primary author: BAGALKOTE, Jayasimha

Presenter: BAGALKOTE, Jayasimha

Session Classification: ARDENT Midterm review

Contribution ID: 59

Type: **not specified**

ESR 6 presentation - AIT

Monday 14 October 2013 15:15 (15 minutes)

Primary author: SIPAJ, Andrej

Presenter: SIPAJ, Andrej

Session Classification: ARDENT Midterm review

Contribution ID: **60**

Type: **not specified**

ESR 7 presentation - CTU

Monday 14 October 2013 15:30 (15 minutes)

Primary author: CAICEDO, Ivan

Presenter: VYKYDAL, Zdenek (Czech Technical University (CZ))

Session Classification: ARDENT Midterm review

Contribution ID: **61**

Type: **not specified**

ESR 9 presentation - CTU

Monday 14 October 2013 16:30 (15 minutes)

Primary author: BERGMANN, Benedikt Ludwig (Czech Technical University (CZ))

Presenter: BERGMANN, Benedikt Ludwig (Czech Technical University (CZ))

Session Classification: ARDENT Midterm review

Contribution ID: 62

Type: **not specified**

ESR 10 presentation- IBA

Monday 14 October 2013 16:45 (15 minutes)

Primary author: BISELLO, Francesca

Presenter: BISELLO, Francesca

Session Classification: ARDENT Midterm review

Contribution ID: **63**

Type: **not specified**

ESR 11 presentation - IBA

Monday 14 October 2013 17:00 (15 minutes)

Primary author: TOGNO, Michele

Presenter: TOGNO, Michele

Session Classification: ARDENT Midterm review

Contribution ID: 64

Type: **not specified**

ESR 12 presentation - JABLOTRON

Monday 14 October 2013 17:15 (15 minutes)

Primary author: Dr VISWANATHAN, Vijayaragavan

Presenter: Dr VISWANATHAN, Vijayaragavan

Session Classification: ARDENT Midterm review

Contribution ID: 65

Type: **not specified**

ESR 13 presentation - MIAM

Monday 14 October 2013 17:30 (15 minutes)

Primary author: NAIK, Alvin Sashala

Presenter: NAIK, Alvin Sashala

Session Classification: ARDENT Midterm review

Contribution ID: 66

Type: **not specified**

ESR 14 presentation - POLIMI

Monday 14 October 2013 17:45 (15 minutes)

Primary author: SAGIA, Elena (National Technical Univ. of Athens (GR))

Presenter: SAGIA, Elena

Session Classification: ARDENT Midterm review

Contribution ID: 67

Type: **not specified**

ESR 15 presentation - POLIMI

Monday 14 October 2013 18:00 (15 minutes)

Primary author: CASSELL, Christopher (P)

Presenter: CASSELL, Christopher (P)

Session Classification: ARDENT Midterm review

Contribution ID: 68

Type: **not specified**

Incontri con i ricercatori ARDENT e dimostrazione delle attività di ricerca / Meetings with ARDENT researchers and presentations of the scientific activities

Wednesday 16 October 2013 15:00 (1h 30m)

Session Classification: Outreach Day “MISURARE LE RADIAZIONI: UN ASPETTO FONDAMENTALE NELLA PRATICA MEDICA, INDUSTRIALE, NELLA RICERCA E NEL PROGRESSO AEROSPAZIALE”