

## AGOSTINO LANZA – INFN Pavia

### Esperienze professionali degli ultimi anni:

- **2021.** Delegato del Comitato Nazionale per il Trasferimento Tecnologico INFN (CNTT) alla preparazione e sottomissione dei casi studio di pertinenza del Trasferimento Tecnologico per la Valutazione della Qualità della Ricerca (VQR) 2015 – 2019;
- **2020 – oggi.** *Manager* gestionale del progetto InSpIRIT, finanziato da Regione Lombardia, per la realizzazione della terza sorgente ionica del CNAO;
- **2019 – oggi.** Rappresentante INFN in HEPTech, la rete di trasferimento tecnologico delle istituzioni facenti parte del CERN;
- **2017 – oggi.** Componente del CNTT;
- **2017 – oggi.** Coordinatore di livello 2 (L2) del progetto *Power System* dell'*upgrade* di fase 2 dello spettrometro di muoni di ATLAS, e componente dello *Steering Group*;
- **2014 – oggi.** Coordinatore L2 dei servizi del progetto NSW di ATLAS fase 1, e componente dello *Steering Group*;
- **2014 – oggi.** *Manager* gestionale del progetto XPR-MIUR per la costruzione del fascio di ricerca del CNAO. Il progetto, in fase di conclusione, ha richiesto l'istruzione di 7 gare a firma del Presidente INFN e svariate decine di gare a firma del Direttore della Sezione;
- **2013 – oggi.** Costruzione del rivelatore Micromegas per il progetto NSW di ATLAS fase 1, con responsabilità per il sistema di *grounding*, per il circuito di polarizzazione del rivelatore e per la distribuzione dell'alta tensione ai differenti *layer* delle camere;
- **2012 – 2020.** Coordinatore locale in CSN5;
- **2005 – oggi.** Responsabile L2 della progettazione, implementazione e manutenzione dei servizi elettrici dello spettrometro muonico di ATLAS.

### Altre attività:

- **2012 – oggi.** RUP per gli esperimenti di CSN5, per i progetti XPR-MIUR e InSpIRIT, e per le grandi attrezzature della sezione di Pavia. RUP per gli ordini locali sulle convenzioni nazionali con RS e con CAEN;
- **2013 – 2015.** Presidente della commissione esaminatrice locale per gli assegni di ricerca.
- **1994 – oggi.** Presidente o componente di 11 commissioni di concorso per l'assegnazione di posizioni permanenti o a tempo determinato, di cui una commissione nazionale per il concorso di Primo Tecnologo 2018.

Agostino Lanza

## Curriculum vitae

### Informazioni personali

Nome: **Andrea Rappoldi**  
Anno di nascita:  
Istituto: INFN - Istituto Nazionale di Fisica Nucleare  
Indirizzo:  
email: `andrea.rappoldi@pv.infn.it`

### Istruzione e formazione

1993 **Ph.D. in fisica**  
Università degli Studi, Pavia (Italia)  
*Analisi delle prestazioni di una camera a proiezione temporale ad argon liquido finalizzata allo studio della fisica del neutrino*  
1989 **Laurea in fisica**  
Università degli Studi, Pavia (Italia)  
*Rivelazione di Sciami Atmosferici Estesi a livello del mare mediante campionamento di eventi multi-muoni in un calorimetro tracciante*

### Impieghi

2009 - presente **Tecnologo informatico (secondo livello)**  
INFN - Istituto Nazionale di Fisica Nucleare, Pavia (Italia)  
Progetto, sviluppo e gestione dei sistemi di calcolo e dell' infrastruttura della rete dati della Sezione INFN; supporto tecnologico ed informatico all' utilizzo del calcolo scientifico ed avanzato  
1992 - 2009 **Tecnologo informatico (terzo livello)**  
INFN - Istituto Nazionale di Fisica Nucleare, Pavia (Italia)  
Responsabile del Servizio Calcolo e reti della Sezione INFN; gestione completa dell' infrastruttura di calcolo e rete dati

### Attività

2018 - presente **Progettazione e simulazione del nuovo telescopio spaziale HERD (High Energy cosmic Radiation Detector), uno dei principali progetti scientifici della Stazione Spaziale Cinese. In particolare, vengono eseguite simulazioni del PSD (Plastic Scintillator Detector) e vengono effettuati dei test di alcuni prototipi di rivelatore utilizzando fasci di particelle prodotti presso i grandi acceleratori europei [2]**  
2014 - 2019 **Studio e simulazione di un calorimetro omogeneo e ad alta accettazione per la rivelazione di raggi cosmici di alta energia nello spazio (progetto CaloCube) [5, 9]**  
2008 - presente **Analisi approfondita dei dati prodotti dal satellite AGILE, rivolta anche all' astronomia *multi-messaggeri*, come neutrini [4, 6, 8], onde gravitazionali [10], sorgenti  $\gamma$  di alta energia [11] e lampi di raggi gamma terrestri [12]**

- 2014 - 2016 Studio e simulazione di un nuovo rivelatore per la misura di raggi cosmici e raggi  $\gamma$  di alta energia nello spazio (collaborazione Gamma-400)
- 2005 - 2008 Studio del funzionamento ed analisi delle caratteristiche del rivelatore tracciante di raggi  $\gamma$  della missione AGILE, tramite simulazioni Montecarlo [3, 7] e calibrazioni effettuate presso l'acceleratore dei laboratori INFN di Frascati [14, 15]
- 2001 - 2012 Conduzione ed analisi dei dati dell' esperimento ICARUS (progettato per la fisica delle oscillazioni del neutrino) durante le prove tecniche iniziali presso la Sezione INFN di Pavia e successivamente durante il funzionamento a regime nei laboratori sotterranei del Gran Sasso [1, 13, 16, 18]
- 1991 - 2001 Progettazione, sviluppo e costruzione di alcuni prototipi di *camere a proiezione temporale* ad argon liquido (LAr TPC) in preparazione al progetto ICARUS dell'INFN, per le applicazioni nella fisica del neutrino e della stabilità della materia barionica [19, 20, 21], e rivelatori ad argon liquido a doppia fase per la ricerca della materia oscura con l' esperimento WARP [17]
- 1989 - 1991 Costruzione e messa in opera dell' esperimento  $\bar{\nu}\bar{\nu}2$  presso il reattore nucleare dell' istituto ILL di Grenoble, per investigare l' esistenza di possibili fenomeni molto rari di oscillazione neutrone-antineutrone [22]

#### Publicazioni di maggior rilievo

- [1] *Study of space charge in the ICARUS T600 detector*, M. Antonello et al., JINST **15** (2020) P07001
- [2] *Beam test characterization of a Plastic Scintillator Prototype for the space-based cosmic ray experiment HERD*, P.W. Cattaneo et al., JINST **15** (2019) C07027
- [3] *AGILESim: Monte Carlo Simulation of the AGILE Gamma-Ray Telescope*, V. Fioretti et al., Astrophys. J. **896** 61 (2020)
- [4] *AGILE Detection of Gamma-Ray Sources Coincident with Cosmic Neutrino Events*, F. Lucarelli et al., Astrophys. J. **870** 136 (2019)
- [5] *The CALOCUBE project for a space based cosmic ray experiment: design, construction, and first performance of a high granularity calorimeter prototype* O. Adriani et al., JINST **14** (2019) P11004
- [6] *Multimessenger observations of a flaring blazar coincident with high-energy neutrino IceCube-170922A*, M.G. Aartsen et al., Science **361** eaat1378 (2018)
- [7] *Calibration of AGILE-GRID with On-ground Data and Monte Carlo Simulations*, P.W. Cattaneo et al., Astrophys. J. **861** 125 (2018)
- [8] *AGILE Detection of a Candidate Gamma-Ray Precursor to the ICECUBE-160731 Neutrino Event*, F. Lucarelli et al., Astrophys. J. **846** no. 2, 121 (2017)
- [9] *CaloCube: A new-concept calorimeter for the detection of high-energy cosmic rays in space*, E. Vannuccini et al., Nucl. Instr. Meth. **A845** (2017) 421-424

- [10] *AGILE observations of the gravitational-wave event GW150914*, M. Tavani et al., *Astrophys. J. Lett.*, **825** (2016) L4
- [11] *Search of MeV-GeV counterparts of TeV sources with AGILE in pointing mode*, A. Rappoldi et al., *A&A* **587** A93 (2016)
- [12] *Enhanced detection of terrestrial gamma-ray flashes by AGILE*, M. Marisaldi et al., *Geophys. Res. Lett.* **42** (2015) 9481-9487
- [13] *Measurement of the neutrino velocity with the ICARUS detector at the CNGS beam*, M. Antonello et al., *Phys. Lett. B* **713** (2012) 17-22
- [14] *Characterization of a tagged  $\gamma$ -ray beam line at the DAΦNE Beam Test Facility*, P.W. Cattaneo et al., *Nucl. Instr. Meth.* **A674** (2012) 55-66
- [15] *First results about on-ground calibration of the silicon tracker for the AGILE satellite*, P.W. Cattaneo et al., *Nucl. Instr. Meth.* **A630** (2011) 251-257
- [16] *Underground operation of the the ICARUS T600 LAr-TPC: first results*, C. Rubbia et al., *JINST* **6** (2011) P07011
- [17] *The Current Status of the WARP Experiment*, A.M. Szec et al., *Acta Phys. Pol.* **B37** (2006) 1997-2004
- [18] *Design, construction and tests of the ICARUS T600 Detector*, S. Amoroso et al., *Nucl. Instr. Meth.* **A527** (2004) 329-410
- [19] *Detection of scintillation light in coincidence with ionizing tracks in a liquid argon time projection chamber*, P. Cennini et al., *Nucl. Instr. Meth.* **A432** (1999) 240-248
- [20] *Performance evaluation of a hit finding algorithm for the ICARUS detector*, F. Arneodo et al., *Nucl. Instr. Meth.* **A412** (1998) 440-453
- [21] *A neural network approach for the TPC signal processing*, P. Cennini et al., *Nucl. Instr. Meth.* **A356** (1995) 507-513
- [22] *A New Experimental Limit on Neutron-Antineutron Oscillations*, M. Baldo Ceolin et al., *Z. Phys.* **C63** (1994) 409-416

## CV of Francesca Ballarini

Associate Professor, University of Pavia, Physics Department (SSD FIS/07), from 01/12/2017

Abilitazione Scientifica Nazionale – I fascia (SC 02/D1, SSD FIS/07-Fisica Applicata), obtained on 12/09/2018

President of the Italian Society for Radiation Research (SIRR)

### Education, Research and Publications

Francesca Ballarini got her Physics “Laurea” (MSc) in 1997 (grade: 110/110 *cum laude*) at the University of Milano with a Thesis work on the modelization of radiation-induced chromosome damage, which was awarded by the Italian Society for Radiation Research (SIRR). Afterwards, FB continued her research activity in the field of ionizing radiation, for which a specific PhD course was not available, by means of several non-permanent contracts (mainly, research scholarships and fellowships), among which a research fellowship provided by the Houston University and funded by NASA Johnson Space Center (Houston, TX). In 2005 FB won a permanent research fellow position at the University of Pavia, in 2013 she got the National Scientific Qualification (ASN) as Associate Professor, and in 2017 she won a position as Associate Professor at the University of Pavia,

Currently, FB leads the **group of Computational Radiobiology** of the Pavia Physics Department, which currently consists of three post-doc fellows, one PhD student and two MSc students. The activity of the group is focused on the development of **biophysical models and Monte Carlo codes** that simulate the action of ionizing radiation in biological targets, with particular attention to applications for cancer ion therapy, or „hadrontherapy“. In particular, FB is **main author of the model/code BIANCA** (BIophysical ANalysis of Cell death and chromosome Aberrations), which simulates the induction of cell death and chromosome damage in cells irradiated by photons and by different ions, including those used in hadrontherapy. Recently, the model has been validated for *in vitro* and *in vivo* animal irradiation by protons and Carbon ions; a pilot study on C-ion cancer patients showed that the BIANCA predictions are in line with those provided by the two models currently used in clinics for C-ion patient treatment, that is the Local Effect Model (or LEM, used in Europe and in Shanghai, China) and the Microdosimetric Kinetic Model (or MKM, used in Japan). Furthermore, FB worked at the radiobiological modelization in the field of Boron Neutron Capture Therapy (BNCT) and at the calculation of astronaut doses following space radiation exposure, as well as the modelization of the so-called *bystander effect* (that is, induction of damage in unirradiated cells following molecular signalling by irradiated ones). On these topics, starting **from 1998 FB published 105 articles in journals indexed in Scopus and/or ISI-WoS** (plus other 55 articles in non-indexed journals) and **3 book chapters**, she delivered **38 invited talks** at national or international conferences (plus 22 contributed presentations), she gave numerous seminars at Italian and foreign institutions, and she got several awards, including a support by NASA-Johnson Space Center in the framework of the NASA/JSC Radiation Program.

### Honors and awards

FB has just been elected **President of the Italian Society for Radiation Research (SIRR)**, and in the past she was in the **Board of Councillors of IARR** - International Association for Radiation Research. Furthermore, FB is **peer-reviewer** for the main international journals in the field and she was **project reviewer** for the Swedish Space Agency, the French National Alliance for Life and Health Sciences (jointly with the French National Cancer Institute), and the Czech Science Foundation (the main public funding institution for research in the Czech Republic); she is **editor** of the international journal *AIMS Biophysics* (indexed in ISI/WoS and Scopus), she was **guest editor** for the international journals *Int. J. of Molecular Sciences* and *Advances in Space Research*, she is **Editor-in-Chief** of the Italian journal *Radiazioni – Ricerca e Applicazioni* and, until now, she was member of the **scientific and/or organizing committee of 14 national or international conferences**, as well as the selection board for an Associate Professor position at Università dell’Insubria.

For the University of Pavia, FB is member of the **Technical-Scientific Committee of LENA** (Applied Nuclear Energy Laboratory) and of „**Presidio di Qualità**“, she is „**Preposto**“ for ionizing radiation at the Physics Department, she is member of the PhD Colloquia Committee at the Physics Department, she is responsible for the contacts between the Physics Department and CNAO for the „LM plus“ project, and she was member of the Committee that revised the Statute of the University of Pavia according to the 240/2010 law („legge

Gelmini\*), as well as numerous selection committees for post-doc positions (both at the Physics Department and at the INFN Pavia Section) or scientific awards.

### Projects and collaborations

The aforementioned research activities are carried out in the framework of many national and international collaborations. Those currently ongoing include the following institutions: **CNAO - Centro Nazionale di Adroterapia Oncologica** (*M Pullia, A Facchetti et al.*), **HIT - Heidelberg Ion-beam Therapy** centre (*A Mairani et al.*); **DKFZ - German Cancer Research Center** (*C Karger et al.*); **NCAA - Nanjing University of Aeronautics and Astronautics**, China; **University of Campinas**, Brazil (*M Bernal et al.*), **AVO-ADAM**, Meyrin, Switzerland (*W Kozłowska et al.*); **Istituto Nazionale Tumori di Milano** (*T Rancati et al.*); **INFN-Milano** (*P. Sala, A Ferrari and G Battistoni*). FB is also member of the **Radiobiology working group of ISNCT-International Society of Neutron Capture Therapy** and of **RENOVATE**, an international research network on BNCT; finally, in 2019 FB participated in a international collaboration consisting of the main experts in the field, which led to the definition of a new standard for the simulation of radiation-induced DNA damage.

FB participated in many national and international research projects (among which **6 funded by EU**, **2 by MIUR**, **2 by the Italian Space Agency** and **18 by INFN-National Institute of Nuclear Physics**), also as (local) PI and „external advisor”.

### Teaching and supervising

At the University of Pavia, FB currently teaches basic Physics, Radiation Protection, Health Physics Simulation and Physics of Innovative Oncological Therapies, as well as Applied Physics in two Medical Specialization Schools; she is also member of the teaching staff of a PhD course on *Computational Mathematics and Decision Sciences* (cycle XXXIV). In the past, FB gave Radiobiology lectures for a Master of the *European School of Advanced Studies on Nuclear and Ionizing Radiation Technology* of the IUSS Institute in Pavia, for the PhD in Physics of the University of Pavia and for the Health Physics Specialization School of the University of Milan. Until now, FB was supervisor or co-supervisor of **36 Thesis works (including BSc, MSc and PhD)**;

Pavia, Italy, August 31, 2021



Francesca Ballarini

CURRENT POSITION:

- ASSOCIATE PROFESSOR, University of Pavia. Physics Department, SSD FIS/07, since 2017
- 'Abilitazione Scientifica Nazionale – I FASCIA', SSD FIS/07, since 2018
- PRESIDENT of SIRR-Italian Society for Radiation Research
- group leader at the University of Pavia, Physics Dept. (Computational Radiobiology group, consisting of 3 post-docs, 1 PhD student and several undergraduate students)

BIBLIOMETRIC INDICATORS (Scopus): papers=96, h-index=26, cit.=1521

EDUCATION and PREVIOUS POSITIONS:

- Physics "Laurea" (MSc) cum laude, 1997, University of Milano, with a thesis on the modelization of radiation-induced chromosome damage, awarded by SIRR-Italian Society for Radiation Research
- 3 research scholarships at the University of Milano, Physics Dept, 1998-99
- assegno di ricerca at the University of Milano, Physics Dept, 2000-01
- assegno di ricerca at the University of Milano, Physics Dept, 2001-02
- assegno di ricerca at the University of Pavia, Physics Dept, 2003
- post-doc fellowship from the Houston University (funded by NASA-JSC), Dec 2003- Mar 2004
- assegno di ricerca at the University of Milano, nov 2004-oct 2005
- ricercatore a tempo indeterminato, University of Pavia, Physics Dept, nov 2005-nov 2017

RESEARCH ACTIVITY:

- general framework: action of ionizing radiation in biological targets at different levels (molecular, cellular and tissue/organs), with applications in cancer ion therapy ("hadrontherapy") and radiation protection
- specific activity: development of biophysical models and Monte Carlo codes simulating the action of ionizing radiation in biological targets, with focus on hadrontherapy applications
- FB is main author of the model/code BIANCA (BIophysical ANALYSIS of Cell death and chromosome Aberrations), which simulates cell death and chromosome damage in cells irradiated by photons and by different ions, including those used in hadrontherapy. The model has been validated for in vitro and in vivo irradiation by protons and Carbon ions, and the C-ion predictions are in line with those of the only two models currently used for C-ion patient treatment worldwide, that is LEM-Local Effect Model version I, used in Europe and in Shanghai, and MKM-Microdosimetric Kinetic Model, used in Japan. In 2019 FB was part of an international collaboration among the main experts in the field, which defined a new standard for radiation-induced DNA damage simulation
- FB also worked at the following topics: radiobiological modelization for BNCT-Boron Neutron Capture Therapy; calculation of astronaut doses following space radiation exposure; modelization of "bystander effect" (induction of damage in unirradiated cells following molecular signalling by irradiated ones)

PUBLICATIONS and CONFERENCE PRESENTATIONS since 1998:

- 105 papers published (or in press) in journals indexed in Scopus and/or ISI-WoS
- 55 other articles (proceedings, non-indexed journals etc.)

- 3 chapter books
- 38 invited conference talks (22 at international conferences, 16 at national conferences)
- 24 contributed conference presentations (17 at international conferences, 7 at national conferences)
- 12 invited seminars at Italian or foreign institutions

#### HONORS and AWARDS:

- President of SIRR-Italian Society for Radiation Research, 2021-22
- member of the Board of Councillors of IARR-International Association for Radiation Research, 2015-19
- project reviewer for the Swedish Space Agency, 2005 and 2010
- project reviewer for the French National Alliance for Life and Health Sciences, 2016
- project reviewer for the Czech Science Foundation, 2018
- member of the Board of Councillors of SIRR, 2011-14 and 2019-22
- editor of AIMS Biophysics, indexed in WoS and Scopus, since 2018
- Editor-in-Chief of the Italian journal 'Radiazioni-Ricerca e Applicazioni', since 2003
- guest editor of Int. J. of Molecular Sciences, indexed in WoS and Scopus, 2020
- guest editor Advances in Space Research, indexed in WoS and Scopus, 2007
- peer-reviewer for the main international journals in the field (more than 20 journals)
- member of the scientific and/or organizing committee of 14 conferences (9 international and 5 national)
- member of the selection committee for an Associate Professor position at Università dell'Insubria, 2018
- member of the Technical-Scientific Committee of LENA-Applied Nuclear Energy Laboratory of the University of Pavia, since 2018
- member of "Presidio di Qualità di Ateneo" of the University of Pavia, since 2019
- member of the PhD School "Computational mathematics and decision sciences", University of Pavia, since 2018
- "preposto" for ionizing radiation at the Physics Department, since 2018
- member of the PhD Colloquia Committee at the Physics Department, since 2016
- responsible for the contacts between the Physics Department and CNAO-Centro Nazionale di Adroterapia Oncologica for the "LM plus" project, since 2019
- member of the Committee that revised the Statute of the University of Pavia according to the 240/2010 law, 2011
- member of numerous selection committees for post-doc positions in Pavia or students scientific awards
- member of ERRS-European Radiation Research Society, since 2016
- member of SIRR-Società Italiana per le Ricerche sulle Radiazioni, since 2000
- associated to INFN-Istituto Nazionale di Fisica Nucleare, since 1998 ("incarico di ricerca" since 2009)
- travel award, 2004 Nuclear Data Conference, Santa Fe, 2004
- travel award, '3rd Int. Workshop on Space Radiation Research', Port Jefferson (NY), 2004
- financial support by NASA-JSC to attend the 2002 Cospar meeting in Houston
- young scientist award, 'The 2nd International Workshop on Space Radiation Research', Nara, Japan, 2002
- Young Scientist Award. 'DNA and chromosomes', Cargese, France, 2000
- Young Scientist Award, '9th Gray Workshop', Harwell, UK, 1998
- Thesis award by SIRR-Società Italiana per le Ricerche sulle Radiazioni, 1998

#### MAIN ONGOING COLLABORATIONS:

- CNAO-Centro Nazionale di Adroterapia Oncologica (M Pullia, A Facoetti et al.)
- HIT-Heidelberg Ion-beam Therapy centre (A Mairani et al.)



- DKFZ-German Cancer Research Center (C Karger et al.)
- University of Naples 'Federico II' (L Manti et al.)
- NUAA-Nanjing University of Aeronautics and Astronautics, China
- University of Campinas, Brazil (M Bernal et al.)
- AVO-ADAM, Meyrin, Switzerland (W Kozłowska et al.)
- Istituto Nazionale Tumori Milano (T Rancati et al.)
- INFN-Milano (P Sala, A Ferrari and G Battistoni)
- Radiobiology working group of ISNCT-International Society of Neutron Capture Therapy
- RENOVATE, an international research network on BNCT

#### FUNDED RESEARCH PROJECTS:

- local PI for the INFN project ETHICS, 2015-18
- local PI for the INFN project MiMo\_Bragg, 2012-13
- FABR project (Finanziamento delle Attività Base di Ricerca), 2018
- PI of a young investigator project funded by the University of Milan, 2002
- external advisor for the EU project BioQuaRT, 2014-15
- participant of the EU project NECTAR, since 2020
- participant of the EU project NOTE, 2006-09
- participant of the EU project RISC-RAD, 2004-08
- participant of the EU project 'Improved cancer risk quantification for environmental, medical and occupational exposures to low doses of ionizing radiation by mechanistic models', 2000-02
- participant of the EU project 'Biophysical models for the induction of cancer by radiation', 1996-99
- participant of the FIRB project 'La terapia per cattura neutronica: una nuova prospettiva per il trattamento dell'osteosarcoma', 2010-13
- participant of the PRIN project 'Effetti biologici della radiazione cosmica: esperimenti su linfociti con particelle cariche e microgravità simulata, e relativi modelli biofisici', 2001-02
- participant of the ASI-Agenzia Spaziale Italiana project Mo-Ma/COUNT, 2006-08
- participant of the ASI project 'Influence of the shielding in the space radiation biological effectiveness', 2000-02
- participant of other 18 projects funded by INFN since 1997

#### TEACHING and SUPERVISING:

- teaching of many courses (basic Physics, Radiation Protection, Health Physics Simulation and Physics of Innovative Oncological Therapies) for BSc or MSc students, University of Pavia, University of Milano and Politecnico Milano, since 2000
- course of Applied Physics in two Medical Specialization Schools, University of Pavia, since 2018
- radiobiology lectures for the international Master 'Nuclear and Ionizing Radiation Technology', IUSS Pavia, 2003-12
- radiobiology lectures for the PhD school in Physics, University of Pavia, 2003
- radiobiology lectures for the Health Physics Specialization School, University of Milano, 2001-08
- supervisor/co-supervisor of 7 PhD Thesis works
- supervisor/co-supervisor of 5 Specialization or Master Thesis works
- supervisor/co-supervisor of 26 MSc or BSc Thesis works