

CURRICULUM VITAE

Saverio Altieri



Name : Saverio Altieri

Place and date of birth: Poggiorsini (Bari) Italy, 3th August 1953

Nationality: Italian

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Languages: English (fluent), French (fluent)

Present position: Associate Professor at Department of Physics, University of Pavia

Web pages:

<http://fisica.unipv.it/personale/Persona.php?ID=248>

Associate Professor at Department of Physics, University of Pavia and supervisor of BSc, MSc and PhD students.

Specially Appointed Associate professor at Okayama University (Neutron Therapy Research Center), Okayama, Japan (Jan. 16th – Feb. 28th 2019 and May – September 2021);

Since October 2016 President of the Technical Scientific Committee (CTS) of the Laboratory of Applied Nuclear Energy (LENA) of University of Pavia equipped with a 250 kW Triga Mark II Nuclear Research Reactor and an IBA cyclotron (model Cyclone 18/9).

Member of Board of Councilors of the International Society for Neutron Capture Therapy (ISNCT).

The scientific activity consists on research in basic and applied nuclear physics, in the following branches: Neutronics and research of new techniques for tumour radiotherapy, Nuclear Reactors and Health Physics, Photoreactions at intermediate energies in light nuclei.

The research in applied nuclear physics is performed at the 250 kW nuclear reactor of LENA Laboratory (Pavia, Italy) and at other international centers. In the past a collaboration among some departments of the University of Pavia (Nuclear and Theoretical Physics, Experimental Surgery, Animal Biology) developed a new technique for the treatment of diffuse hepatic metastases based on Boron Neutron Capture Therapy (BNCT) of explanted liver. After the experimental phase on small animals, the technique was applied, for the first time in the World, on two terminal patients. In this collaboration S.A. played a principal role in the assessment of a nuclear technique for the boron concentration measurement in tumor and healthy tissues based on charged particle spectrometry, in the development of an imaging technique to visualize the boron bio-distribution by neutron

autoradiography, in the design and construction of the irradiation position of an explanted liver in the thermal column of the Pavia reactor, and in the gamma and neutron dosimetry.

After this experience, research in BNCT is continuing at Pavia University, under S.A.'s supervision, in collaboration with National Institute of Nuclear Physics (INFN) and National and International Universities. Efficacy and toxicity of BNCT is studied *in vitro* and *in vivo*; cell survival is studied in different cell lines comparing the BNCT treatment with neutron only and with gamma radiations; *in vivo* the efficacy of BNCT is studied in mice measuring the tumor evolution after the treatment by an animal Magnetic Resonance Imaging (MRI) system (in collaboration with the Department of Molecular Biotechnology and Health Sciences of Torino University); this research is based on new borated formulations specifically developed for BNCT (nanoparticles, liposomes, AT-101-LDL-B-Gd ...).

Many efforts are now devoted by Pavia BNCT team to:

- the installation of an accelerator based BNCT facility at National Oncological Hadron Therapy Center (CNAO) of Pavia;
- an experimental study dedicated to a Single Photon Emission Computed Tomography (SPECT) system based on Zinc Cadmium Telluride (CZT) for *in vivo* boron dose imaging in BNCT.

Main Funded Projects: Principal Investigator (PI) / Local Responsible (LR) / Participant (P)

- H2020-FETOPEN-2021-2024. GRANT N 899768, Proposal acronym: NECTAR, Proposal title: NEutron Capture-enhanced Treatment of neurotoxic Amyloid aggRegates. P
- 2020-2023 INFN experiment ENETR_BNCT (Establishing New TEchnologies foR BNCT @CNAO); PI
- From 2019: INFN experiment ANET on neutron dosimetry; LR
- From 2019: INFN experiment NEPTUNE (Nuclear process-driven Enhancement of Proton Therapy UNravEled); P
- From 2018: Fisica Biomedica per la Terapia e la Diagnostica dei Tumori (Biomedical Physics for tumor diagnostic and therapy) project funded by Ministry of Education as Physics Department of Excellence; P (Responsible for the BNCT part)
- From 2018: INFN Experiment CH_NET on Prompt Gamma Neutron Activation Analysis (PGNAA); P
- From 2017: INFN experiment 3CaTs on SPECT for boron dose *in vivo* imaging in BNCT based on Zinc Cadmium Telluride (CZT); P
- 2016-2018: NEU_BEAT (Neutron Beams for Cancer Treatment) Project in the frame of the Executive Program of Scientific and Technological Cooperation between Italy and China. Italian Ministry of Foreign Affairs and International Cooperation (MAECI). P
- From 2016: INFN experiment BEAT_PRO on BNCT; LR
- 2013-2016: INFN experiment NETTUNO "Neutron Capture Therapy of Thoracic Tumors with new formulations" 36 months; PI
- 2013: INFN project MUNES, "Multidisciplinary Neutron Source", participant and responsible for the BNCT activities; P
- 2013-2015: INFN experiment NEUTARGS, "NEUtron production TARGetS"; P
- 2011-2013: INFN experiment ARCO (Analysis of Reactor Core); P
- 2011-2013: INFN experiment NUC-SMILE, "NUCclear Subcritical Multiplication Installation for Lead Experiment"; P
- 2011-2012 INFN experiment MIMO_BRAGG, "Misura e modellazione di danno citogenetico lungo la curva di Bragg di ioni accelerati"; P
- 2010: "Ricerca finalizzata" Ministry of Health "Boron neutron capture therapy (BNCT) in cutaneous recurrences of breast cancer: the diagnostic and therapeutic utility of ¹⁸F-FBPA PET/CT"; 24 months; P

- 2009-2012: INFN experiment WIDEST1 (Wide Spread Tumors BNCT) 48 months; PI
- 2008-2009: CARIPLO call Scientific and Technological Research on Advanced Materials "Caratterizzazione di nanomagnetici molecolari per MRI nel trattamento tumorale per cattura neutronica (NCT) con particolare enfasi per la BNCT"; LR
- 2007-2008: INFN experiment ELBA (Explanted Liver BNCT Application); PI
- 2007-2008: INFN experiment WIDEST (Wide Spread Tumors BNCT); PI
- 2006-2007: PRIN: Trattamento delle metastasi polmonari mediante cattura neutronica: studi preliminari; PI
- 2006-2009: INFN experiment CTT; P
- 2005-2008: FIRB International: Studi proteomici e farmacocinetici in relazione alla terapia anti-tumorale BNCT;LR
- 2004-2005: PRIN: Misure di assorbimento del boro in tessuto polmonare di ratto affetto da tumore; PI
- 2004-2006: INFN experiment TAOOrMINA3, "Trattamento Avanzato Organi Mediante Irraggiamento Neutronico e Autotrapianto; P
- 2002-2003: INFN experiment EFRAM; participant;
- 2000-2005: INFN experiment GDHN; P
- 1998-2000: PRIN "Studio delle prestazioni di nuovi rivelatori gassosi (RPC) sottoposti a flussi di neutroni e gamma e ottimizzazione dei materiali impiegati nella loro costruzione"; P.

Academic Teaching Activity

- From 2002 to date: chair of the course **Physics of Ionizing Radiation** for the MSc Physics;
- From 2014 to date: chair of the course **Accelerators and Nuclear Reactors**;
- From 2015 to date: chair of the course **Diagnostic Techniques** for the MSc Physics;
- From 2016 to date: chair of the course **Applied Physics** for the BSc Medicine;
- From 2001 to 2014: chair of the course **Experimental Physics** for the BSc in Biotechnologies;
- From 2004 to 2008: chair of the course **Simulation in Biosanitary Physics** for the MSc Physics;
- From 1995 to 2001: chair of the course **Physics** for the BSc in Natural Sciences;
- From 2002 to 2014: seminars at IUSS (Istituto Universitario di Studi Superiori) at the International Master in Nuclear and Ionizing Radiation Techniques.
- from 1983 to 1995:
 - exercises for the course of General Physics II, BSc in Physics
 - collaborator in practical exercises in the courses of neutron physics, physics of nuclear reactors, introduction to nuclear physics, accelerator physics;
 - lectures on the radiation dosimetry and radioprotection in the course of Particle accelerators, MSc in Physics;
 - lectures on nuclear reactors for the Specialization School in Physics
 - member of exam commission for the courses of particle accelerators, introduction to nuclear physics, neutron physics, reactor physics, general physics II, physics lab for biological sciences.
- From 2004, supervisor of 5 PhD students:
 1. Silva Bortolussi, "Boron Neutron Capture Therapy of Disseminated Tumours", Dottorato in fisica - XX ciclo discussion: 10-01-2008. Tutor: Saverio Altieri, referee: dr Raymond Moss, JRC, Petten, NL.
 2. Sabrina Stella "Design of a Prompt Gamma Neutron Activation Analysis (PGNAA) system for Boron Neutron Capture Therapy (BNCT) using Monte Carlo code" Dottorato in Fisica - XXII ciclo discussion: 16-02-2012. Tutor: Saverio Altieri, referee: Kent Riley Harvard University Massachusetts General Hospital, USA
 3. Nicoletta Protti, "The efficacy of Boron Neutron Capture Therapy on small animal models – Preliminary tests in the neutron field of the thermal column of Pavia TRIGA Mark II reactor" – XXIV

cicle, discussion: 16-02-2012. Tutor: Saverio Altieri and David Nigg Idaho National Laboratory USA, referee: Stuart Green Medical Physics - University Hospitals Birmingham UK

4. Ian Postuma, “Clinical application of accelerator-based Boron Neutron Capture Therapy: optimization of procedures, tailoring of a neutron beam and evaluation of its dosimetric performance”. Tutor: Saverio Altieri and Silva Bortolussi, referee: Hiroaki Kumada (University of Tsukuba) and Stuart Green (University of Birmingham)
 5. Setareh Fatemi, III year PhD, XXX cicle working on CdZnTe detector prototype for in vivo Boron imaging by SPECT;
- Supervisor of 2 master theses at IUSS (Istituto Universitario di Studi Superiori), Pavia, International Master in Nuclear and Ionizing Radiation Technologies.
 - From 1985 to date, supervisor/co-supervisor of 42 BSc-MSc theses.
 - Lecturer:
 - on Radiation Physics and Dosimetry at Summer School at Nanjing University of Aeronautics and Astronautics, Nanjing, China (Aug. 3-14 2020);
 - on Radiation Physics and Dosimetry at Summer School at Nanjing University of Aeronautics and Astronautics, Nanjing, China (Jul. 8-19 2019);
 - on Nuclear Reactor Physics and BNCT at Suranaree University of Technology (SUT), Nakhon Ratchasima, Thailand (Sept. 3-7, 2018);
 - at Jornadas del CUIA en Argentina - Curso Intensivo “Terapia por Captura Neutrónica en Boro” Edición May 2018, Buenos Aires, Argentina;

Non academic teaching experience

- 1977-1981: Physics Professor in Secondary Schools
- 1978-1981: Physics Professor at the School for Technicians in Medical Radiology
- Public invited seminars on the issues involved in the use of nuclear reactors for energy production, functioning, security, radioactive waste, Chernobyl and Fukushima accidents.
- Public invited seminars on BNCT and the use of radiation in medicine.

Dissemination and editorial activities

- Organization of international congresses
 - o XIX Nuclear Physics Divisional Conference dell'EPS: New Trends in Nuclear Physics Applications and Technology, Pavia 5-9 September 2005, member of Local Organizing Committee;
 - o 13° International Congress on Neutron Capture Therapy, Firenze 2-8/11/2008, Secretary General
 - o 15° European Research Reactor Conference RRFM, 20-24/03/2011 Rome member of Local Organizing Committee;
 - o VIII Young Researchers BNCT meeting, Pavia September 2015, member of Organizing Committee;
- From November 2018 – Member of Editorial Board of Therapeutic Radiology and Oncology .
- Guest Editor “13th International Congress on Neutron Capture Therapy BNCT: a new option against cancer” Volume 67, Issues 78, Supplement, Pages S1-S380 “Applied Radiation and Isotopes” (July 2009);
- from 2005: Peer Reviewer of international journals as “Applied Radiation and Isotopes”, “The British Journal of Radiology”, “European Journal of Medical Physics”, “International Journal of Radiation Oncology*Biological*Physics”, “Radiation Research”,
- from 2007: referee of INFN experiments Apotema, Aracne, Dante, Deuterons, Fluka2, Geant4, Marte, N@Btf, Neudos, Neutra, Orione, Phd, Vbl-Rad, Rdh, Silenzio Cosmico, Neurapid;

- Public invited seminars on the issues involved in the use of nuclear reactors for energy production, functioning, security, radioactive waste, Chernobyl and Fukushima accidents.
- Public invited seminars on BNCT and the use of radiation in medicine.

Titles

- 2015: Associate Professor, sector FIS/07, Department of Physics, University of Pavia, coordinator of the research activities in the field of Boron Neutron Capture Therapy (BNCT)
- 2012 National Scientific Qualification for first level Professorship, Sector 02/B3 – Applied Physics (Call 2012 - DD n. 222/2012)
- 2012 National Scientific Qualification for second level Professorship, Sector 02/B3 – Applied Physics (Call 2012 - DD n. 222/2012)
- 2012 National Scientific Qualification for second level Professorship, Sector 02/A1 – Nuclear Physics (Bando 2012 - DD n. 222/2012)
- 1996 – 1998: Director of LENA, tasks: director of the staff and technical director of the reactor.
- 1991 - 2015 Researcher at the Department of Physics, University of Pavia
- 1983-1991: in charge at LENA, University of Pavia; vice responsible of the reactor, Qualified Expert of the reactor, III level. Study of nuclear security issues, of the reactor environmental impact and impact on health due to reference incidents.
- 19/07/1995 Qualification as Technical Director of nuclear installations after a training period at Lena
- 11/06/1986 Qualification to the nuclear Triga Mark II management as Supervisor, after a training period at Lena;
- 1984 – 1998: member of “Collegio dei Delegati alla sicurezza dell’impianto” at Lena;
- 1983 - 1993: Lena Qualified Expert with rector nomination;
- December 1976: MSc in Nuclear Physics (105/110), experimental thesis "*Effetti biologici indotti in Piophila casei L. da dosi neutroniche prodotte in reattore*"; carried out at LENA; supervisor prof. Tazio Pinelli, co-supervisor prof. Luciano Sacchi;
- 1977-1978 required military service;
- 1978-1981: Visiting period as a Physicist at the Service of Health Physics of Hospital S. Bortolo in Vicenza; photon and electron beam dosimetry at the linear electron accelerators of 4 MV and 18 MV for radiotherapy. Treatment planning calculations.
- 1977-1981: Physics Professor at Secondary School;

Education

- November 1972 – December 13th 1976: Student at Universities of Bari and Pavia for Nuclear Physics degree - final grade: 105/110
- 1971-1972: One year High School supplementary course
- October 1967 - July 1971: High School - final grade: 60/60 and Rotary Club Golden Medal as first classified in the final exam
- 1964-1967 Middle School
- 1959-1964 Primary School.

Courses

- 12-16/11/1984 Course "Analisi di affidabilità e sicurezza" at CCR-Euratom di Ispra;
- 19-23/05/1980: Course "Radioprotezione nelle attività medico-sanitarie" at CCR-Euratom di Ispra;

Awards and Honors

- 1971: Rotary Club Golden Medal as first classified in the final exam of High School;

Contact Persons for International Scientific Agreements

- 1) Agreement for cooperation between University of Pavia and Favaloro University, Buenos Aires (Argentina); 2018
- 2) Agreement for cooperation between University of Pavia and Nanjing University of Aeronautics and Astronautics (China); 2018
- 3) Collaboration in reactor physics and nuclear medical applications under the INL Faculty Staff Exchange (FSE) program between University of Pavia and Idaho National Laboratory USA 01/2011 12/2013;
- 4) Agreement for cooperation in the BNCT field between University of Pavia and Essen Universitätsklinikum 07/2006 07/2009;
- 5) Agreement between University of Pavia and the Johannes Gutenberg-Universität Mainz, in the BNCT field) 08/2006 08/2009;
- 6) Agreement on academic exchange between University of Pavia and Medical Center for translational research and Osaka University hospital in the fields of basic research and translational medicine on Neutron Capture Therapy 11/2008 11/2013.

Memberships

- from November 2018: member of Editorial Board of Therapeutic Radiology and Oncology Journal.
- from November 2018: elected member of Advisory Councilors Board of ISNCT;
- from 2016: President of Technical and Scientific Committee of the Laboratory of Applied Nuclear Energy (LENA, University of Pavia);
- from 2008 to 2018: Member, with ministerial appointment, of Technical Commissions VIA-VAS (art. 9 D.P.R. 14/05/2007 n. 90) for Environmental Impact Evaluation at the Ministry for Environment;
- from 2007 to 2012: Coordinator of scientific activity of National Scientific Commission V at INFN, Unit of Pavia;
- from 2007 to 2012: member of National Scientific Commission V (INFN);
- from 2006 to 2012: elected member of Executive Board of ISNCT;
- from 2004 to 2016: member of Technical and Scientific Committee of the Laboratory of Applied Nuclear Energy (LENA, University of Pavia);
- from 2004: member of International Society for Neutron Capture Therapy (ISNCT);
- in the last years: Observer at INFN_Energy on behalf of National Scientific Commission V;
- form 2000 Liaison officer for Nuclear Energy Agency (NEA) Data Bank;
- form 1985: Associated at Istituto Nazionale di Fisica Nucleare (INFN)
- 1984: member of “Collegio dei Delegati alla sicurezza dell’impianto” at Lena, University of Pavia;
- from 1981 In the national list of Qualified Experts for radioprotection (grade III);

Recent Invited Talks

- “Boron determination and imaging” IAEA Virtual Technical Meeting on Advances in Boron Neutron Capture Therapy, July 27-31 2020
- “BNCT physics working group in EU”, IAEA Consultancy Meeting on Neutron Capture Therapy: current status and new developments, 28 October - 01 November 2019, IAEA Headquarters, Vienna, Austria

- “Boron measurement and imaging techniques in BNCT” - 1st Russian Conference and Young Researcher School on Boron Neutron Capture Therapy, Novosibirsk State University, 21-24 Oct. 2019
- BNCT physics working group in EU, 28-01-2019, National Cancer Center – Tokyo, Japan
- 18th ICNCT - October 28 – November 2, 2018 Taipei, Taiwan
- 1st IAEA-TECDOC-1223 Revision Working Group Meeting on BNCT Beam Dosimetry and Recommendation, June 14-15 2018, University of Aeronautics and Astronautics (NUAA), Nanjing, China
- Neudos -13 14-19 May, 2017 Krakow, Poland
- Jornada del CUIA en Argentina 9a. Edición Terapia por Captura Neutrónica en Boro (BNCT) Neutrones para la Salud, 20-24 April, 2017
- Side event on BNCT at the IAEA 2016 General Conference, Vienna, September 26, 2016
- Congress of Science and Technology of Thailand, October, 2015
- PTFM50 Warsaw, Poland September 4th 2015
- 15th International Congress of Radiation Research (ICRR2015) May 25 to 29, 2015 in Kyoto, Japan.
- “Neutron Capture Therapy Research at INFN and University of Pavia” 9th International Conference on Anticancer Researcher 6-10 october 2014 Porto Carras, Sithonia, Greece
- “Research in neutron capture therapy at University of Pavia” 1st KURRI International Workshop on Neutron Capture Therapy”, March 27-29, 2014, Osaka, Japan
- “Extra-corporeal liver BNCT for the treatment of diffuse metastases” - 7th young researchers' boron neutron capture therapy meeting, Granada Spain dal 22-09-2013 al 26-09-2013
- “Boron Neutron Capture Therapy: research and application in Pavia” Centro Oncologico Tommaso Campanella, Catanzaro, 05-12-2011
- “BNCT research for disseminated tumours” Bucarest 2010
- “BNCT of widespread tumours using nuclear reactor Pavia experience, Workshop “Requirements for BNCT at a Nuclear Research Reactor” Praga 2005
- Since 2007: Series of invited scientific seminars on BNCT treatment for liver metastases in National, European and Extra-European Institutions, i.e. at Universidad de La Plata, at Instituto de Oncología Ángel H. Roffo di Buenos Aires and at Comision Nacional de Energía Atómica (Buenos Aires) in Argentina.

Publications

Author of 257 publications of which:

- 137 papers in peer-reviewed international journals
- 114 contributions in international conference proceedings
- 4 contributions in books
- 2 books

Database SCOPUS total citations 2486, h-index 27

Pavia, July 2021

Saverio Altieri

