

**SURNAME** Bortolussi

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**PLACE OF BIRTH** Latisana, Udine, Italy

**DATE OF BIRTH** 8<sup>th</sup> November 1978

**CITIZENSHIP** Italian

**SEX** female

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**MOTHER TONGUE:** Italian

**FOREIGN LANGUAGES:** English: fluent, Spanish: fluent

**POSITION:** Temporary Researcher at the Department of Physics, University of Pavia.

### Education

8 January 2008 PhD thesis defence

Oct 2004-Dec 2007 PhD studies at University of Pavia, Italy

21 May 2004 Defense of her graduation thesis at the University of Trieste. *"TAOrMINA: an original configuration of the neutron field for a better dose uniformity in the explanted organ"*, written in Italian language, tutor: Prof. Luciano Bertocchi. Grade: 110/110 cum laude

July 2003-May 2004 Research experience at the University of Pavia, Department of Nuclear and Theoretical Physics to finalize the graduation thesis

Oct 1997-July 2003 Graduate studies at University of Trieste, Italy, curriculum in Nuclear and Sub-nuclear Physics, medical applications.

June 1997 High School Diploma, scientific curriculum, grade: 60 (best possible grade)

### Doctoral Thesis

Dr Bortolussi defended in English her PhD thesis titled “*Boron Neutron Capture Therapy of disseminated tumours*” on the 8<sup>th</sup> January 2008 at the Department of Nuclear and Theoretical Physics, University of Pavia (supervisor Dr Saverio Altieri, University of Pavia ; referee Dr Raymond Moss, JRC, Petten, The Netherlands).

### **Training Courses**

Dr Bortolussi has attended a number of specialist training courses as follows:

October 2011 IAEA Workshop: “Monte Carlo Radiation Transport and Associated Needs for Medical Applications”, ICTP, Trieste, Italia

oOctober 2010 MatLab Course, Universidad Tecnologica Nacional, Buenos Aires, Argentina

July 2006 Participated in the MCNPX workshop (Training Course on MCNPX, Intermediate Level), at ENEA, Bologna, Italy.

June 2006 Attended the Nuclear Physics Software Course, Alghero, Italy

Sept 2005 Attended the Nuclear Physics School Course, Otranto, Italy

### **Research experience**

The major research interest of Dr Silva Bortolussi is in the field of Boron Neutron Capture Therapy (BNCT). At the University of Trieste she specialized in Nuclear Physics, in particular in its medical applications. She then moved to Pavia in order to work in the field of BNCT. She worked together with the team that performed, for the first time in the world, the application of BNCT to an explanted human liver affected by multiple metastases. On 2<sup>nd</sup> July 2003 she participated in the second clinical application of this innovative technique, playing a role in the <sup>10</sup>B concentration measurement in liver tissues and in the assessment of the treatment plan. Her major task was to determine the thermal neutron flux and the dose distribution inside the explanted liver using Monte Carlo calculations and experimental measurements.

Participation in the clinical application was an important step towards Dr Bortolussi’s further specialization in BNCT. The first year at Pavia lead to her *MD* thesis, dedicated to a MCNP study of different configurations of the irradiation facility to obtain a better dose uniformity inside the liver. After graduation (May 2004), she began her PhD at the University of Pavia, working on the application of BNCT to diffuse tumours. During these 3 years, together with her supervisor Dr Saverio Altieri, she started a feasibility study for the treatment of diffuse lung tumours. As presented in her PhD thesis, many results were obtained which largely justify further studies of this application. During these years Dr Bortolussi increased her knowledge of Monte Carlo transport codes (MCNP, MCNPX, SRIM), of data analysis tools such as ROOT, and of program languages (C and C++). She gained considerable experience in <sup>10</sup>B concentration measurement, using charged particle spectrometry and in boron biodistribution imaging using neutron autoradiography.

She hold a post-doc in BNCT of diffuse tumours for 3 years at the Department of Nuclear and Theoretical Physics, University of Pavia (research grant funded by Cariplo and by INFN), dedicating mainly to BNCT application to disseminated tumours.

She is presently temporary researcher at the University of Pavia, Department of Physics, thanks to the project FIRB-futuro in ricerca, funded by Italian Ministry of University and Research for the years 2011-2013. S.B. is principal investigator of this project, dedicated to BNCT of Osteosarcoma.

### **Abroad research experience**

In 2007, Dr Bortolussi spent 2 months at Buenos Aires, Argentina, working at the RA-3 reactor (Comisión Nacional de Energía Atómica). She collaborated with physicists and biologists in developing a challenging form of BNCT for liver using the auto-transplant technique. She mainly contributed to the simulation of the thermal column of the RA-3. She also collaborated in the development of gel phantoms to simulate explanted liver lobes, and performed neutron flux measurements in air and in phantoms.

In 2009 she spent another period (3 months) in the same laboratory of CNEA in Buenos Aires, dedicating to the simulation of the RA-3 reactor, especially to the assessment of the neutron source. Furthermore, she collaborated to the biologists group, discussing the results of a joint experimental work performed on rats and hamsters tissues treated with boron. During these period, new samples were prepared and a new activity was planned to be developed in collaboration, concerning the comparison of methods to measure boron by different techniques and by imaging. In this period she was invited to give a seminar at Centro Atomico Constituyentes, another one at the reactor RA-3 and she was invited to participate at a round table at the Roffo Hospital, during the workshop "Radiotherapy with particles and non-conventional beams".

In 2011 she returned to CNEA in order to continue the works started in collaboration. During the last stay in Buenos Aires a new branch of the shared research was started, dedicated to the study of the dose distribution in lung using simulated beams from accelerators and reactors.

The collaboration between S.B.'s has been extended over the years and it allowed to host in Pavia 3 researchers of CNEA at the Department of Physics, and one of them got a contract for one year and a half at the Department of Physics.

Similar agreement in which S.B. is involved, were signed between University of Pavia and the Universities of Essen and Mainz in Germany. In particular, Silva Bortolussi participates in the project for the liver application at the reactor of Mainz both in the measurements activity and in the Monte Carlo simulations. In many occasions she went to Mainz for the activities related to the liver BNCT project in Mainz. The last time she was involved in the collection of samples of a patient, treated with BPA and operated at the University Hospital of Mainz.

### **Awards**

The presentation of the results of Dr Bortolussi's thesis at the 12<sup>th</sup> International Congress on Neutron Capture Therapy (Takamatsu, Japan, 9-13 October 2006) received a Fairchild Award for young researcher. The awarded paper was: S.Bortolussi et al. "*Boron Uptake Measurements in metastatic Tumours in Rat Lung*".

3rd March 2011 invited seminar at Crotona, "La terapia per cattura neutronica: una nuova prospettiva per il trattamento dell'osteosarcoma" (Award Giovanni Carcea for a young researcher in the field of young tumour patients) Inner Wheel Club, Crotona

### **Congress Organization, honors**

She was part of the Organizing Committee of the 13<sup>th</sup> International Congress on NCT, held from 2<sup>nd</sup> to 7<sup>th</sup> November 2008 in Florence (<http://www2.pv.infn.it/~icnct-13/index.html>). The congress is organized by the International Society of Neutron Capture Therapy (ISNCT) every two years, and delivers about 200 presentations covering every BNCT-related field. For the two years period 2008-2009, the president of ISNCT and ICNCT-13 and the General Secretary of the congress were both in the Pavia research group. Dr Bortolussi played a major role in organizing both logistic and

scientific aspects of the event, maintaining contacts with foreign BNCT researchers and helping in the scientific program preparation. A selection of the works presented at the congress was collected in a special issue of the Journal Applied Radiation and Isotopes, of which she is one of the Guest Editors.

S.B. is part of the Scientific Committee of the International Congress on Neutron Capture Therapy (14-ICNCT, <http://www.14icnct.com.ar/>), hold in Buenos Aires, Argentina, in October 2010 and of 15-ICNCT, (<http://square.umin.ac.jp/ICNCT15/>) hold in Tsukuba, Japan, in September 2012. She is presently member of the Scientific Committee of the Young Members BNCT meeting that will take place in Granada, Spain in October 2013.

S.B. is councilor of International Society for Neutron Capture Therapy, section of physics and member of the Executive Board of the same Society.

### **Invited Talks at National and International Congresses**

S.B. was invited to 4 workshops in the frame of European Integration Action, organised by JRC (Petten, The Netherlands) in which important topics related to the clinical application of BNCT were discussed with groups from western Europe. She was also invited to give 3 seminars in Argentina, where she spent 2 research periods at CNEA, (Comision Nacional de Energia Atomica) Buenos Aires.

1. S. Bortolussi "A new perspective for the treatment of osteosarcoma by BNCT" , scuola di specializzazione in ortopedia, campus di Germaneto, Universita' della Magna Grecia Catanzaro, 28 marzo 2011
2. 3rd March 2011, "La terapia per cattura neutronica: una nuova prospettiva per il trattamento dell'osteosarcoma", Inner Wheel Club, Crotone.
3. S.Bortolussi, "Modelado de la facilidad de irradiación para BNCT de RA-3", Centro Atomico Ezeiza, Buenos Aires, Argentina, 31<sup>st</sup> October 2009.
4. S.Bortolussi, "La BNCT en Pavia", conference cycle "BNCT y mas allà", Centro Atomico Constituyentes, Buenos Aires, Argentina, 28<sup>th</sup> Octubre 2009.
5. S.Bortolussi "BNCT in Pavia (Italy): new perspectives", Taller de terapia con particulas y haces no convencionales, Instituto de Oncología "Ángel H. Roffo" XXV Jornadas de Oncología, Buenos Aires, Argentina, 3-4 September 2009
6. S.Bortolussi, "The lung BNCT: feasibility and efficacy study on a rat model", Giornata di studio Boron Neutron Capture Therapy: una nuova prospettiva nel trattamento dei tumori, Pavia, Italy, 3<sup>rd</sup> June 2009
7. S.Bortolussi, S.Altieri "Monte Carlo Studies for the treatment of diffuse tumors using neutron fields (BNCT)", Workshop MARS (Metodi numerici per Applicazioni Radioprotezionistiche e Sanitarie), 2-3 dicembre 2008 Bologna, Italy

8. S.Bortolussi, S.Stella, S.Altieri "Alpha spectroscopy & neutron autoradiography: clinical & preclinical results", JRC Enlargement and Integration Action: Boron Analysis & Boron Imaging in Biological Materials for BNCT, Bucharest, Romania, 23-25 November 2008.
9. S.Bortolussi, S.Altieri "Neutron flux distribution in liver at the Pavia reactor", JRC Enlargement and Integration Action: Innovative Treatment Concepts for Liver Metastases, Petten, The Netherlands, 11-12 October 2007
- 10S.Bortolussi, S.Altieri "Neutron flux distribution in liver at the Pavia reactor", JRC Enlargement and Integration Action: Innovative Treatment Concepts for Liver Metastases, Essen, Germany, 7-9 December 2006.

### **Presentations at National and International Congresses**

Dr Bortolussi participated in a number of International and National congresses:

1. "Neutron Spectrometry for the University of Pavia TRIGATM Thermal Neutron Source Facility", 2012 American Nuclear Society Winter Meeting, 11-15 November, 2012, San Diego, CA, USA
2. "Boron concentration measurement by  $\alpha$  spectrometry and quantitative neutron autoradiography in cell and tissue samples treated with different boronated formulations and administration protocols", 15-ICNCT, 10-14 September 2012, Tsukuba, Japan (She was also chairperson of one session)
3. "Simulation of the neutron flux in the irradiation facility at RA-3 reactor", 14<sup>th</sup> International Conference on Neutron Capture Therapy (ICNCT-14), Buenos Aires, Argentina, 25-29 October 2010
4. "10B measurement by alpha spectrometry and 10B imaging by neutron autoradiography as a contribution to the understanding of BNCT radiobiology in oral cancer and liver metastases animal models" 14th International Conference on Neutron Capture Therapy (ICNCT-14), Buenos Aires, Argentina, 25-29 October 2010 (She was also chairperson of one session)
5. "BNCT of disseminated tumors: research and application in Pavia", Incontri di Fisica Applicata, Isola d'Elba (IFA), 23-28 May 2010
6. "<sup>10</sup>B measurements on samples: techniques and perspectives", "Sorgenti di neutroni e loro applicazioni in ambito INFN", Laboratori Nazionali di Legnaro dell'INFN 17-18-19 November 2009
7. "Boron Concentration measurements in lung tissues by charged particles spectrometry", 13<sup>th</sup> International Congress on Neutron Capture Therapy, 02-07 November 2008, Florence, Italy
8. "Boron Neutron Capture Therapy of lung tumors: preliminary studies", Congresso annuale della Società Italiana di Fisica, 21-26 September 2008, Genova, Italy

9. "Boron Neutron Capture Therapy Activity of diffused tumours at TRIGA Mark II in Pavia", 4th World TRIGA Users Conference, 07-10 September 2008, Lyon, France.
10. "The BNCT of Lung Tumours: Preliminary Studies", Young Researcher BNCT Meeting, Birmingham, 20-21 September 2007. (She was also chairperson of one session)
11. "Boron Uptake Measurements in metastatic Tumours in Rat Lung", 12th International Conference on Neutron Capture Therapy (ICNCT-12), Takamatsu, Japan, 9-13 October 2006

### **Teaching experience**

SB is chair of the course *Simulazioni in Campo Biosanitario*, for the MSc Degree in Physics at University of Pavia.

S.B. has given seminars for the Experimental Physics Course at the School of Biotechnology. She collaborates as assistant for the course of Experimental Physics for Biotechnology and Physics of Ionizing Radiation for the MSc in Physics. She has also helped in the preparation of many graduate theses. She was co-supervisor of a graduate thesis "*Studio della distribuzione della dose in polmone di ratto irraggiato al reattore TRIGA Mark II di Pavia*" (N.Protti, 2008), and supervisor of the thesis "*A neutron autoradiography method to measure  $^{10}\text{B}$  in biological samples applied to BNCT of osteosarcoma*" (I.Postuma, 2012). Presently she is supervisor of a MSc thesis at the Department of Physics and co-supervisor of a PhD student at CNEA, Buenos Aires, Argentina.

### **Participation in funded projects**

S.B. is Principal Investigator of a project funded in the call FIRB-Futuro in Ricerca 2008, for the years 2011-2013, for which she got her position as Temporary Researcher at University of Pavia. The project is shared between two Units, at University of Pavia and University of Florence. S.B. is local responsible of the INFN experiments NeTTuNO and NeuTargs funded for the period 2013-2015. S.B. is local responsible for a project funded by Italian Ministry of Health in the scheme "ricerca finalizzata 2010".

Dr Bortolussi participated in two funded PRIN (Project of National Relevance), the first one in years 2005-2006 and the second one in years 2007-2008. She took part in a FIRB project that was funded for the period 2007-2009. She also participated in INFN projects funded in 2007-2008 (WIDEST BNCT project: WIDESpread Tumours BNCT), and in 2009-2012 (WIDEST1).

S.B. participated in a project at CARIPLO foundation, dedicated to the research of boron compounds coupled with tracers for Magnetic Resonance for Imaging (MRI), funded for the years 2009-2011.