

# Curriculum didattico e scientifico

**Antonio Brunetti**

## **Identità**

Nome :	Antonio
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## Profilo professionale e universitario

- 1989** Laurea in Fisica con la tesi "Caratterizzazione di una telecamera CCD per radiografia digitale", Università di Roma "La Sapienza".
- 1991-1996** Analista programmatore presso l'Informez S.p.A, Roma.
- 1992** Corso di Perfezionamento in "Metodi per l'analisi di segnali e immagini biomediche" presso il Centro Interdipartimentale per l'Analisi dei Modelli e dell'Informazione nei Sistemi Biomedici (C.I.S.B.), Università di Roma "La Sapienza",
- 1993** Scuola estiva in "Digital Imaging", University of Virginia, Charlottesville, U.S.A, 1-6 Agosto.
- 1996-1999** Ricercatore in Fisica presso la Facoltà di Farmacia dell'Università di Sassari.
- 1999-2005** Ricercatore confermato in Fisica presso la Facoltà di Farmacia dell'Università di Sassari.
- 2000** Dottorato di ricerca in Fisica Medica Presso l'Università di S. Paulo, Brasile (*Datazione archeologica mediante Risonanza di Spin Elettronico: sviluppo di metodi e alcune applicazioni*).
- 2005-** Professore associato dell'Università di Sassari

## Attività didattica

### In Italia

Presso l'Università di Sassari:

A partire dal 2005 ha tenuto numerosi corsi di fisica presso la Facoltà di Farmacia e la Facoltà di Agraria dell'Università di Sassari. Saltuariamente ha tenuto anche corsi di matematica e di informatica sempre presso la stessa Università. Negli anni più recenti ha tenuto i seguenti corsi:

- Fisica, Scienze Agrozootecniche, Dipartimento di Agraria dal 2015
- Fisica, Scienze e Tecnologie Agrarie, Dipartimento di Agraria dal 2015
- Fisica, Tecnologie Viticole, enologiche, alimentari, Dipartimento di Agraria (sede di Oristano) dal 2017
- Tecniche di Radiologia Medica 2017
- Fisica, Fisioterapia, Dipartimento di Medicina dal 2017

- Fisica, Tecniche di Laboratorio Biomedico, Dipartimento di Medicina dal 2017
- Fisica, Sicurezza e cooperazione internazionale, Dipartimento di Giurisprudenza, 2017
- Tecnologie Avanzate per la Salvaguardia dei Beni Culturali, Dipartimento di Scienze Politiche, 2015-2017
- Sicurezza e Cooperazione Internazionale, Facoltà di Giurisprudenza, 2017-2018

## **All'estero**

### Presso l'Università di S. Paulo, campus di Ribeirao Preto (Brasile)

- A.A. 2002-2003 Introduzione alla tomografia (4 crediti 60 ore, dottorato in fisica medica) .
- Nell'ambito della mobilità Erasmus plus, un corso di una settimana presso l'Università di Evora, Portogallo, nel programma di master Europeo Archmat (2017,2018)
- Scuola di Archeometria, UERJ, Rio de Janeiro, Brasile 2018

### **Ha tenuto inoltre seminari e corsi presso i seguenti Corsi e Scuole**

1992

College on Medical Physics: Radiation Protection and Imaging Techniques at International Centre for Theoretical Physics (ICTP), Trieste, 28 agosto 18 settembre.

1993

Corso di Perfezionamento in "Metodi per l'analisi di segnali e immagini biomediche" presso il Centro Interdipartimentale per l'Analisi dei Modelli e dell'Informazione nei Sistemi Biomedici (C.I.S.B.), Università di Roma "La Sapienza", giugno.

1994

Corso di Perfezionamento in "Metodi per l'analisi di segnali e immagini biomediche" presso il Centro Interdipartimentale per l'Analisi dei Modelli e dell'Informazione nei Sistemi Biomedici (C.I.S.B.), Università di Roma "La Sapienza", giugno.

1994

College on Medical Physics: Radiation Protection and Imaging Techniques at International Centre for Theoretical Physics (ICTP)", Trieste, 5-23 settembre.

1994

College on Advanced Techniques in Archeometry and Conservation of Works of Art at International Centre for Theoretical Physics (ICTP), Trieste, 17-28 ottobre.

## **Attività Scientifica**

L'attività scientifica é stata svolta principalmente nelle seguenti aree di ricerca:

- **Archeometria**
- **Tomografia a raggi X**
- **Diffrazione a raggi X**
- **Datazione mediante risonanza di spin elettronico (ESR)**
- **Effetti biologici della radiazione**
- **Adroterapia**

## **Collaborazioni**

### **a. Nazionali**

- Dal 2004 al 2006 è stato associato all'Istituto di Struttura della Materia del C.N.R., Roma. Detta collaborazione riguarda lo sviluppo di un tomografo ad alta energia (fino a 450 keV) e la diffrazione a raggi X, come precedentemente descritto. E' previsto inoltre di sviluppare sistemi e misure basati sul FEL (Free Electron Laser, SPARX).
- Dal 2006 collaborazioni Criorad-Excalibur con Le università di Bologna, Pisa, Pavia e Roma III e con i Laboratori Nazionali di Legnaro (LNL-INFN). Dallo stesso periodo è associato INFN.

### **b. Internazionali**

- Argonne National Laboratory, Chicago, IL, USA. Sviluppo del software di ricostruzione tomografica e correzioni dei disallineamenti di rotazione. Dal 2002.
- European Synchrotron Radiation Facility (ESRF), Grenoble, France. Collaborazione sulla tomografia in trasmissione (da giugno 2002), sviluppo di librerie di sezioni d'urto (gennaio 2003) e software per analisi quantitativa per fluorescenza di raggi X. Dal 2003.

- Instituto Politécnico Nacional da Cidade do México, México. Progettazione e realizzazione di un sistema completo per tomografia in trasmissione (1997). Dal 1997
- Departamento de Física e Matemática da FFCLRP-USP, Ribeirão Preto, Brasil. Datazione di reperti fossili con Risonanza di Spin Elettronico (ESR). Dal 1998.
- Dipartimento di fisica Università di S. Marco, Lima, Perù. Analisi mediante fluorescenza X di campioni archeometrici.
- Sincrotrone Soleil, Parigi, Francia.
- Hercules Centre for Cultural Heritage, Evora, Portogallo

E' autore di oltre 120 articoli su riviste internazionali con referee:

### **Articoli su riviste internazionali con referee**

#### **2018**

- [1] Bottaini, C., Brunetti, A., Bordalo, R., Valera, A., Schiavon, N., Non-destructive characterization of archeological Cu-based artifacts from the early metallurgy of southern Portugal, (2018) *Archaeological and Anthropological Sciences*, 10 (8), pp. 1903-1912.
- [2] Hoff, G., Dominguez, J.S., Brunetti, A., De Assis, J.T., Using Monte Carlo to explore 3D reconstruction to geological application: Preliminary characterization of technique limitations a. (2018) *2017 IEEE Nuclear Science Symposium and Medical Imaging Conference, NSS/MIC 2017 - Conference Proceedings*, art. no. 8532913
- [3] Hoff, G., De Assis, J.T., Brunetti, A., Fanti, V., Golosio, B., Comparison of XRMC and Geant4 on dosimetry applied to mammography (2018) *2017 IEEE Nuclear Science Symposium and Medical Imaging Conference, NSS/MIC 2017 - Conference Proceedings*, art. no. 8532758, .
- [4] Cesareo, R., Ridolfi, S., Brunetti, A., Lopes, R.T., Gigante, G.E., First results on the use of a EDXRF scanner for 3D imaging of paintings, (2018) *Acta IMEKO*, 7 (3), pp. 8-12.
- [5] Grazzi, F., Brunetti, A., Scherillo, A., Minoja, M.E., Salis, G., Orrù, S., Depalmas, A., Non-destructive compositional and microstructural characterization of Sardinian Bronze Age swords through Neutron Diffraction, (2018) *Materials Characterization*, 144, pp. 387-392.
- [6] Cesareo, R., Bustamante, A., Jordán, R.F., Fernandez, A., Azeredo, S., Lopes, R.T., Alva, W., Chero, L., Brunetti, A., Gigante, G.E., Ridolfi, S. ,Gold and silver joining technologies in the moche tombs SeñOr de SipáN and SeñOra de Cao jewellery, (2018) *Acta IMEKO*, 7 (3), pp. 3-7.
- [7] Bottaini, C.E., Brunetti, A., Montero-Ruiz, I., Valera, A., Candeias, A., Mirão, J. ,Use of Monte Carlo Simulation as a Tool for the Nondestructive Energy Dispersive X-ray Fluorescence (ED-XRF) Spectroscopy Analysis of Archaeological Copper-Based Artifacts from the Chalcolithic Site of Perdigões, Southern Portugal, (2018) *Applied Spectroscopy*, 72 (1), pp. 17-27.

#### **2017**

- [8] Rao, D. V. et al. "Synchrotron-based XRD from rat bone of different age groups , *Materials Science & Engineering C-Materials For Biological Applications*" 74 207-218 (2017)
- [9] Hoff, Gabriela et al, "Comparison of XRMC and Geant4 on dosimetry applied to mammography", *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) / 24th Book Series: IEEE Nuclear Science Symposium and Medical Imaging Conference* (2017)
- [10] Hoff, Gabriela et al, "Using Monte Carlo to explore 3D reconstruction to geological application: preliminary characterization of technique limitations ", *Ieee Nuclear Science*

**2016**

- [11] Sechi, M., Syed, D.N., Pala, N., Mariani, A., Marceddu, S., Brunetti, A., Mukhtar, H., Sanna, V., Nanoencapsulation of dietary flavonoid fisetin: Formulation and in vitro antioxidant and  $\alpha$ -glucosidase inhibition activities, (2016) *Materials Science and Engineering C*, 68, pp. 594-602.
- [12] Rao, D.V., Gigante, G.E., Kumar, Y.M., Cesareo, R., Brunetti, A., Schiavon, N., Akatsuka, T., Yuasa, T., Takeda, T., Synchrotron-based crystal structure, associated morphology of snail and bivalve shells by X-ray diffraction, (2016) *Radiation Physics and Chemistry*, 127, pp. 155-164.
- [13] Schiavon, N., de Palmas, A., Bulla, C., Piga, G., Brunetti, A., An Energy-Dispersive X-Ray Fluorescence Spectrometry and Monte Carlo simulation study of Iron-Age Nuragic small bronzes ("Navicelle") from Sardinia, Italy, (2016) *Spectrochimica Acta - Part B Atomic Spectroscopy*, 123, pp. 42-46.
- [14] Brunetti, A., Depalmas, A., Di Gennaro, F., Serges, A., Schiavon, N., X-ray fluorescence spectroscopy and Monte Carlo characterization of a unique nuragic artifact (Sardinia, Italy) (2016) *Spectrochimica Acta - Part B Atomic Spectroscopy*, 121, pp. 18-21.
- [15] Brunetti, A., Fabian, J., La Torre, C.W., Schiavon, N., A combined XRF/Monte Carlo simulation study of multilayered Peruvian metal artifacts from the tomb of the Priestess of Chornancap, (2016) *Applied Physics A: Materials Science and Processing*, 122 (6), art. no. 571, .
- [16] Piga, G., Marmi, J., Galobart, À., Brunetti, A., Lasio, B., Malfatti, L., Enzo, S., New data on the presence of celestite into fossil bones from the uppermost Cretaceous Molí del Baró-1 site (Spain) and an alternative hypothesis on its origin, (2016) *Spectrochimica Acta - Part B Atomic Spectroscopy*, 119, pp. 41-49.
- [17] Longo, R., Arfelli, F., Bellazzini, R., Bottigli, U., Brez, A., Brun, F., Brunetti, A., Delogu, P., Di Lillo, F., Dreossi, D., Fanti, V., Fedon, C., Golosio, B., Lanconelli, N., Mettievier, G., Minuti, M., Oliva, P., Pinchera, M., Rigon, L., Russo, P., Sarno, A., Spandre, G., Tromba, G., Zanconati, F., Towards breast tomography with synchrotron radiation at Elettra: First images, (2016) *Physics in Medicine and Biology*, 61 (4), art. no. 1634, pp. 1634-1649.
- [18] Zedde, P., Cudoni, S., Giachetti, G., Manunta, M.L., Masala, G., Brunetti, A., Manunta, A.F., Subchondral bone remodeling: Comparing nanofracture with microfracture. An ovine in vivo study, (2016) *Joints*, 4 (2), pp. 87-93.

## 2015

- [19] Brunetti, A., Golosio, B., Schoonjans, T., Oliva, P., Use of Monte Carlo simulations for Cultural Heritage X-ray fluorescence analysis, *Spectrochimica Acta - Part B Atomic Spectroscopy*, (2015) 108, 15-20.
- [20] Manso, M., Schiavon, N., Queralt, I., Arruda, A.M., Sampaio, J.M., Brunetti, A., Alloy characterization of a 7th Century BC archeological bronze vase - overcoming patina constraints using Monte Carlo simulations, *Spectrochimica Acta - Part B Atomic Spectroscopy*, (2015) 107, pp. 93-96.
- [21] Bottaini, C., Mirão, J., Figueredo, M., Candeias, A., Brunetti, A., Schiavon, N., Energy dispersive X-ray fluorescence spectroscopy/Monte Carlo simulation approach for the non-destructive analysis of corrosion patina-bearing alloys in archaeological bronzes: The case of the bowl from the Fareleira 3 site (Vidigueira, South Portugal), *Spectrochimica Acta - Part B Atomic Spectroscopy*, (2015)103-104, 9-13.
- [22] Cesareo, R., Buccolieri, G., Castellano, A., Lopes, R.T., De Assis, J.T., Ridolfi, S., Brunetti, A., Bustamante, A., The structure of two-layered objects reconstructed using EDXRF-analysis and internal X-ray ratios, *X-Ray Spectrometry*, (2015) 44, 233-238.
- [23] Oliva, P., Golosio, B., Masala, G.L., Schoonjans, T., Brunetti, A., Carpinelli, M., New techniques in diagnostic x-ray imaging: A simulation tool and experimental findings, (2015) *Physics Procedia*, 62, pp. 3-10.
- [24] Antoniassi, M., Poletti, M.E., Brunetti, A. Tomographic images of breast tissues obtained by Compton scattering: An analytical computational study, (2015) *Radiation Physics and Chemistry*, 116, pp. 273-277.

## 2014

- [25] Rescigno, R., Finck, C., Juliani, D., Spiriti, E., Baudot, J., Abou-Haidar, Z., Agodi, C., Alvarez, M.A.G., Aumann, T., Battistoni, G., Bocci, A., Böhlen, T.T., Boudard, A., Brunetti, A., Carpinelli, M., Cirrone, G.A.P., Cortes-Giraldo, M.A., Cuttone, G., De Napoli, M., Durante, M., Gallardo, M.I., Golosio, B., Iarocci, E., Iazzi, F., Ickert, G., Introzzi, R., Krimmer, J., Kurz, N., Labalme, M., Leifels, Y., Le Fevre, A., Leray, S., Marchetto, F., Monaco, V., Morone, M.C., Oliva, P., Paoloni, A., Patera, V., Piersanti, L., Pleskac, R., Quesada, J.M., Randazzo, N., Romano, F., Rossi, D., Rousseau, M., Sacchi, R., Sala, P., Sarti, A., Scheidenberger, C., Schuy, C., Sciubba, A., Sfienti, C., Simon, H., Sipala, V., Tropea, S., Vanstalle, M., Younis, H., Performance of the reconstruction algorithms of the FIRST



experiment pixel sensors vertex detector, Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, (2014) 767, 34-40

- [26] Brunetti, A., Golosio, B., A new Monte Carlo code for simulation of the effect of irregular surfaces on X-ray spectra, *Spectrochimica Acta - Part B Atomic Spectroscopy*, (2014) 94-95, 58-62.
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- [29] Golosio, B., Schoonjans, T., Brunetti, A., Oliva, P., Masala, G.L., Monte Carlo simulation of X-ray imaging and spectroscopy experiments using quadric geometry and variance reduction techniques, *Computer Physics Communications*, (2014) 185 1044-1052.
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- [31] Piga, G., Brunetti, A., Lasio, B., Malfatti, L., Galobart, À., Dalla Vecchia, F.M., Enzo, S., New insights about the presence of celestite into fossil bones from Molí del Baró 1 site (Isona i Conca Dellá, Lleida, Spain), *Applied Physics A: Materials Science and Processing*, (2014) 118 487-496.
- [32] Brunetti, A., Golosio, B., Melis, M.G., Mura, S., A high-quality multilayer structure characterization method based on X-ray fluorescence and Monte Carlo simulation, *Applied Physics A: Materials Science and Processing*, (2014) 118 497-504.

### 2013

- [33] Golosio, B., Oliva, P., Brunetti, A., Luca Masala, G., Carpinelli, M., Meloni, F., Battista Meloni, G., Preliminary study of an angiographic and angio-tomographic technique based on K-edge filters, *Journal of Applied Physics*, 114, Article number 064912 (2013).
- [34] Brunetti, A., Piga, G., Lasio, B., Golosio, B., Oliva, P., Stegel, G., Enzo, S., "Elemental investigation on Spanish dinosaur bones by x-ray fluorescence", *Physica Scripta*, 88, art. no. 015802 (2013)
- [35] Schiavon, N., Celauro, A., Manso, M., Brunetti, A., Susanna, F., "Iron-Age bronze statuettes in Southern Portugal: combining archaeological data with EDXRF and BSEM + EDS to assess provenance and production technology", *Applied Physics A: Materials Science and Processing*, 113, 865-875 (2013).

- 36] Bustamante, A., Cesareo, R., Brunetti, A., Rizzutto, M., Calza, C., Pereira de Freitas, R., Holmsquit, U., Diestra, D., "Analysis of Pre-Columbian objects from Cupisnique, one of the oldest culture from Perú, using a portable X-ray fluorescence equipment", *Applied Physics A: Materials Science and Processing*, 113, 1065-1067 (2013).
- 37] Cesareo, R., Brunetti, A., D'Oriano, R., Canu, A., Demontis, G.M., Celauro, A., "A Roman bronze statuette with gilded silver mask from Sardinia: an EDXRF study", *Applied Physics A: Materials Science and Processing*, 113, 905-910 (2013)
- 38] Agodi, C. et al., FIRST experiment: Fragmentation of ions relevant for space and therapy", *Journal of Physics: Conference Series* 420 (1) , art. no. 012061 (2013)
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- 40] Rao, D.V., Bhaskaraiah, M., Cesareo, R., Brunetti, A., Akatsuka, T., Yuasa, T., Zhong, Z., Takeda, T., Gigante, G.E., "Synchrotron-based non-destructive diffraction-enhanced imaging systems to image walnut at 20 keV", 2013, *Sensing and Instrumentation for Food Quality and Safety*, 7 (1) , pp. 13-21 (2013)
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## 2012

- 42] Rao, D.V., Cesareo, R., Brunetti, A., Akatsuka, T., Yuasa, T., Takeda, T., Gigante, G.E., "Embedded soft-tissue image mechanism of a small animal shell with synchrotron-based micro-CT", *Journal of X-Ray Science and Technology*, 20, 291- 299 (2012).
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- 44] Pleskac, R. et al., "The FIRST experiment at GSI", 2012, *Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 678, 130-138 (2012).
- 45] Golosio, B. et al., "The FIRST experiment for nuclear fragmentation measurements at GSI", *IEEE Nuclear Science Symposium Conference Record*, art. no. 6153861 , pp. 2277-2280 (2012)
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experiment at GSI", *Journal of Instrumentation*, 7, no P02006 (2012)

## 2011

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## 2010

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## 2009

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## 2008

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