Curriculum vitæ

Prof. Dr. Lorenzo Brualla
August 27, 2025

Contents

PERSONAL DATA

Name:	Lorenzo Brualla y Barberà
Birth date:	May 23, 1972
Birth place:	Caracas, Venezuela
Nationality:	Spanish
Private address:	Hohlweg 24, 45147 Essen, Germany
Mobile:	+34 690 913 263
Email:	lorenzo.brualla@uni-duisburg-essen.de
ResearcherID:	B-4672-2013
ORCID:	0000-0003-3385-9623

EDUCATION AND ACADEMIC CAREER

Nov 2020: *Außerplanmäßiger Professor*
Extraordinary Professor
Medizinische Fakultät, Universität Duisburg-Essen (Germany)

Nov 2012: *Habilitation und venia legendi für das Fach Experimentelle Radioonkologie*
Habilitation and *venia legendi* for the area of experimental radiation oncology
Habilitation thesis title: 'Monte Carlo simulation of medical linear accelerators'
Medizinische Fakultät, Universität Duisburg-Essen (Germany)

1998–2002: *Doctor en Ciencias (Físicas)*
Doctor in Sciences (Physics)
Final mark: Excellent Cum Laude (best possible mark in Spain)
Doctoral thesis title: 'Path integral Monte Carlo. Algorithms and applications to quantum fluids' http://hdl.handle.net/2117/93888
Universitat Politècnica de Catalunya (Spain)
Supervisor: Prof. Dr. J. Boronat

(1995–1996): Military Service. Artillery Academy (Spain)
Appointed by the Ministry of Defense and the Ministry of Education as teacher for conscripted personnel without high school degree

1989–1995: *Licenciado en Física* (5-year degree equivalent to M.Sc. in Physics)
Licenciatura thesis title: *'Aproximaciones analíticas a funciones de Kelvin en la propagación de ondas en conductores cilíndricos'* ('Analytic approximations to Kelvin functions applied to wave propagation in cylindrical conductors').
Degree homologated by the Spanish Ministerio de Educación y Cultura to the Spanish title *Licenciado en Ciencias Físicas*
Universidad Simón Bolívar (Venezuela)
Supervisor: Prof. Dr. P. Martin

SCHOLARSHIP

1998–2002: *Beques Formació d'Investigadors de la Generalitat de Catalunya*
Doctoral Scholarship awarded by the Government of Catalonia (Spain)

WORK EXPERIENCE

Jun 2024–present: *Investigador Científico*
Consejo Superior de Investigaciones Científicas, CSIC
Instituto de Física Corpuscular, IFIC, Valencia, Spain

Aug 2018–present: Researcher and faculty member
Westdeutsches Protonentherapiezentrum Essen gGmbH
Hufelandstraße 55, D-45147 Essen, Germany

Dec 2008–Jun 2018: Researcher and faculty member since 2012
Universität Duisburg-Essen
Medizinische Fakultät
Universitätsklinikum Essen
Strahlenklinik
Hufelandstrße 55, D-45147 Essen, Germany

Jul 2004–Nov 2008: Post–doctoral fellow
Universitat de Barcelona
Physics Faculty
Department of Structure and Constituents of Matter
Diagonal 647, E-08028 Barcelona, Spain

Apr 2002–Jun 2004: Post–doctoral fellow
International School for Advanced Studies (SISSA)
Condensed Matter Sector
Institute for the Physics of Matter
INFM DEMOCRITOS National Simulation Center
Via Beirut 2–4, I-34014 Trieste, Italy

SHORT VISITS

Sep 2007–Dec 2007: Visiting Consultant
Sultan Qaboos University
College of Science
Department of Physics
P.O. Box 36, Code 123 Al-Khoud, Sultanate of Oman

Jan 1997–Jul 1997: Post-graduate course on Plasma Physics
Imperial College of Science, Technology and Medicine (United Kingdom)
Blackett Laboratory Supervisor: Prof. Dr. M. Haines

LANGUAGES

- Catalan, native
- Spanish, native
- English, proficient
- Italian, proficient
- French, independent
- German, independent

LICENSES AND COURSES

March 2022: *Spezialkurs im Strahlenschutz in der Tele-, Brachy-, und Röntgentherapie*
Special course on radiation protection in teletherapy, brachytherapy and x-ray therapy
Haus der Technik e. V., Essen (Germany)

December 2021: *Strahlenschutz-Grundkurs für Ärzte und Medizinphysik-Experten (MPE). Mit praktischer Unterweisung*
Basic course on radiation protection for physicians and medical physics experts. With practical instruction
Haus der Technik e. V., Essen (Germany)

October 2021: *Acreditació de recerca avançada Catedràtic*
Accreditation of Full Professor for Advanced Research by the Agència per la Qualitat del Sistema Universitàri de Catalunya, Generalitat de Catalunya (Agency for the Quality of the Catalan Universities, Government of Catalonia)

June 2011: *Kurs Lehren Lernen—Plenardidaktik*
Didactic course for instructors. Requirement for the *venia legendi*
Medizinischen Fakultät der Universität Duisburg-Essen (Germany)

November 2009: *Spezialkurs für Augenärzte zum Erwerb von Kenntnissen im Strahlenschutz bei Umgang mit radioaktiven Augenapplikatoren für Ärzte ohne Fachkunde*
Special course for ophthalmologists on radiation protection when dealing with radioactive eye applicators for physicians without specializaton
Universitätsklinikum Essen (Germany)

June 2009: *Supervisor de instalaciones radiactivas del campo de radioterapia*
Supervisor of radioactive facilities specialized in radiotherapy units
Licence awarded by the Consejo de Seguridad Nuclear (Spanish National Council on Nuclear Safety) through the Universitat Politècnica de Catalunya

MEMBERSHIP IN COMMISSIONS AND INTERNATIONAL INSTITUTIONS

- Leading Writer to the UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation) Annex Report ‘Effects of ionizing radiation on the eye’. Work started on 2025 (planned until 2029).
- Contributing Writer to the UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation) Annex Report ‘Second Primary Cancer after Radiotherapy’, 2025 (https://www.unscear.org/unscear/en/publications/2024_1.html).
- Member of the German Delegation at the UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation) since 2020. Appointed by the Geschäftsstelle der Strahlenschutzkommission, Bundesamt für Strahlenschutz.
- Member of the IAEA (International Atomic Energy Agency) taskforce for the definition of the new standard on radiation phase-space files. Work started in 2021.
- Member of the Publications Committee of the IOMP (International Organization for Medical Physics) since June 2022.

PRIZE

- Prize to the poster 'PRIMO: a graphical user-friendly environment for the automatic Monte Carlo simulation of linacs and dose distributions in patients'. Prize given by the Deutsche Gesellschaft für Radioonkologie (DEGRO). June 2012, Wiesbaden, Germany

ORGANIZATION OF CONGRESSES

- Organizer and president of the scientific committee of the international 'Workshop on the Monte Carlo radiotherapy system PRIMO: Dosimetry and treatment planning research problems', held at the Universitätsklinikum Essen from September 20 to 22, 2017. Event supported by the Deutsche Forschungsgemeinschaft (DFG) and endorsed by the European Society for Radiotherapy and Oncology (ESTRO). (https://www.primoproject.net/)
- Member of the scientific committee of the International Conference of Medical Physics (ICMP 2023) organized by the International Organization for Medical Physics (IOMP). Conference being held in Mumbai, India, 6-9 December 2023. (https://icmp2023.org/)

EDITORIAL BOARDS

- Invited associate editor of Medical Physics (American Institute of Physics)
- Editor of the journal Radiation and Oncology (Springer)

PEER–REVIEWER EXPERIENCE

For funding bodies:

- Deutsche Forschungsgemeinschaft, DFG (German Research Foundation)
- Cancer Research Trust New Zealand

For journals:

- Named as one of the top 20 referees of years 2011 and 2012 by the journal Physics in Medicine and Biology (Institute of Physics)
- Reviewer of most journals in Q1 of the area of medical physics (e.g. Medical Physics, Physics in Medicine and Biology)

DIRECTION OF FUNDED RESEARCH PROJECTS

1. **Principal investigators**: F. Salvat and **L. BRUALLA**
Title of the project: *Simulación y modelización de variaciones anatómicas aplicado a la planificación del tratamiento en radioterapia.* Simulation and modeling of anatomic variations applied to radiotherapy treatment planning
Funding agency: Junta de Comunidades de Castilla–La Mancha (Regional Government)
Project number: PBC06-0019 **Funded amount**: EUR 9,100
Duration: 2006–2009

2. **Principal investigator**: **L. BRUALLA**
Title of the project: Development of a procedure for hyper-pure germanium detector response calibration combining experimental measurements with Monte Carlo simulations
Funding agency: Deutsche Forschungsgemeinschaft
Project number: BR 4043/1-1 **Funded amount**: EUR 164,948
Duration: 2011–2013

3. **Principal investigator**: **L. BRUALLA**
Title of the project: A user-friendly Monte Carlo system for the accurate simulation of clinical beams and dose distributions in radiotherapy patients
Funding agency: Deutsche Forschungsgemeinschaft
Project number: BR 4043/3-1 **Funded amount**: EUR 291,047
Duration: 2015–2018

4. **Principal investigator**: **L. BRUALLA**
Title of the project: Monte Carlo characterization of a new detector holder for IAEA/WHO dosimetry audits
Funding agency: International Atomic Energy Agency
Duration: 2019 **Funded amount**: EUR 9,000

5. **Principal investigator**: **L. BRUALLA** (WPE)
Project coordinator: I. Thierry-Chef (ISGlobal, Spain)
Title of the project: HARMONIC. Health effects of cardiac fluoroscopy and modern radiotherapy in paediatrics
Funding agency: Euratom research and training programme 2014-2018. H2020 Framework programme of the European Commission
Project number: 847707
Funded amount granted to the WPE: EUR 787,225
Funded amount granted to the Consortium: EUR 7,000,000
Duration: 2019–2024

6. **Principal investigator**: **L. BRUALLA** (WPE)
Project coordinator: C. Robert (Institute Gustave Roussy, France)
Title of the project: DOSELIA. Computing whole-body radiation dose distributions and subsequent cancer risks from modern radiotherapy techniques in paediatric patients
Funding agency: HORIZON PIANOFORTE Framework programme of the European Commission
Project number: TBD
Funded amount granted to the WPE: EUR 101,501
Funded amount granted to the Consortium: EUR 944,496
Duration: 2025–2029

PARTICIPATION IN FUNDED RESEARCH PROJECTS

1. **Principal investigator**: J. A. Padró
Title of the project: *Simulación por ordenador del comportamiento atómico en sistemas condensados: Estructura y propiedades dinámicas.* Computer simulation of atomic behaviour in condensed matter: structure and dynamical properties
Funding agency: DGES, Spanish Government
Project number: PB96-0170-C03 **Funded amount**: PTA 10,750,000
Duration: 1997–2000
Conducted tasks: Doctoral student. Development of a path integral Monte Carlo code for superfluids

2. **Projektkoordinator**: M. Mareschal and P. Nielaba
Title of the project: Challenges in Molecular Simulations: Bridging the length and time-scale gap
Funding agency: European Science Foundation
Project number: SIMU **Funded amount**: FF 4,000,000
Duration: 1999–2003
Conducted tasks: Doctoral student. Development of a sampling method for computing the Compton profile in quantum Monte Carlo

3. **Principal investigator**: J. Casulleras
Title of the project: *Estudio de fases condensadas de helio e hidrógeno mediante métodos de Monte Carlo cuántico.* Study of condensed phases in helium and hydrogen using Quantum Monte Carlo methods
Funding agency: DGES, Spanish Government
Project number: PB98-0922 **Funded amount**: PTA 4,000,000
Duration: 1999–2003
Conducted tasks: Doctoral student. Study of liquid hydrogen in confined geometries

4. **Principal investigator**: E. Guardia
Title of the project: *Grup de simulació per ordinador en matèria condensada.* Condensed matter computer simulation group
Funding agency: Generalitat de Catalunya (Catalan Government)
Project number: 1999SGR-00146 **Funded amount**: PTA 3,600,000
Duration: 2000–2001
Conducted tasks: Doctoral student. Improvement of the Trotter-number extrapolation

5. **Principal investigator**: S. Fantoni
Title of the project: *Programma di ricerca scientifica de rilevante interesse nazionale.* Scientific research programme of relevant national interest
Funding agency: Ministero dell'Istruzione, dell'Università e della Ricerca (Italy)
Project number: 2003024047-001 **Funded amount**: EUR 83,300
Duration: 2003–2004
Conducted tasks: Post-doctoral fellow. Study of superfluids in confined geometries

6. **Projektkoordinator**: J. Barthe
Title of the project: MAESTRO Project: Methods and Advanced Equipment for Simulation and Treatment in Radiation Oncology
Funding agency: European Commission, Sixth Framework Programme
Project number: LSHC-CT-2004-503564 **Funded amount**: EUR 10,200,000
Duration: 2004–2009
Conducted tasks: Post-doctoral fellow. Development of a fast Monte Carlo code for implementation in a treatment planning system

7. **Principal investigator**: F. Salvat
Title of the project: *Simulación Monte Carlo con PENELOPE: Desarrollo de modelos de interacción, caracterización de haces de radiación, y aplicaciones en física médica.* Monte Carlo simulation with PENELOPE: Development of interaction models, characterisation of radiation beams, and applications to medical physics
Funding agency: Ministerio de Educación y Ciencia (Spanish Government)
Project number: FPA2006-12066 **Funded amount**: EUR 77,440
Duration: 2006–2009
Conducted tasks: Post-doctoral fellow. Development of new range rejection variance-reduction techniques for the Monte Carlo simulation of medical linear accelerators

8. **Principal investigator**: J. Sempau
Title of the project: Development of an automated Monte Carlo-based linac simulator and radiotherapy treatment planning system for research: application to ion chambers in small off-axis fields
Funding agency: Ministerio de Economía y Competitividad
Project number: FIS2012-38480 **Funded amount**: EUR 65,520
Duration: 2013–2015
Conducted tasks: Member of the research group. Creation of an ad-hoc geometry for the simulation of the TrueBeam linac

9. **Principal investigator**: D. Flühs
Title of the project: *Entwicklung von Mikrokollimatoren zur hochpräzisen konformalen Bestrahlung von Augentumoren mit I-125-Brachytherapie-Applikatoren.* Development of micro-collimators for high precision conformal irradiation of ocular tumors with I-125 brachytherpy plaques
Funding agency: Deutsche Forschungsgemeinschaft
Project number: FL 733/1-1 **Funded amount**: EUR 214,000
Duration: 2017–2019
Conducted tasks: Member of the research group. Monte Carlo simulation of ruthenium eye plaques

10. **Principal investigator**: B. Timmermann
Title of the project: *Roboter für krebskranke Kinder.* Robot for children with cancer
Funding agency: Stiftung Universitätsmedizin Essen. PSD Bank Rhein-Ruhr
Funded amount: EUR 15,000
Duration: 2019–2020
Conducted tasks: Member of the research group. Definition and coordination of the tasks to be conducted between the programmers and psychologists.

DIRECTION OF FUNDED COLLABORATION WITH INDUSTRIAL PARTNERS

1. **Principal investigator**: **L. BRUALLA**
Funding company: Sentinel Spain S.L. (Spain)
Duration: 2011–2012
Conducted tasks: Project direction. Simulation of the linear accelerator Varian Linatron M6A with the PENELOPE code

2. **Principal investigator**: **L. BRUALLA**
Funding company: RADformation Inc. (United States)
Duration: 2021–present
Conducted tasks: Trade secret

3. **Principal investigator**: **L. BRUALLA**
Funding company: ZAP Surgical Inc. (United States)
Duration: 2021–present
Conducted tasks: Trade secret

TABULAR SUMMARY OF PUBLICATIONS

	Total	As first or last author	In the first quartile (Q1)
Articles	66	45	31
Review articles	1	1	0
Letters and comments	2	2	1
Book chapters	1	1	–
Published abstracts	66	44	–
Other publications	14	13	–

ARTICLES IN PEER-REVIEWED JOURNALS

1. **L. BRUALLA**, P. Martin
Analytic approximations to Kelvin functions and applications
J. Phys. A: Mathematical and General. 9153–9162, **34**, 2001 IF 1.453, Q1

2. **L. BRUALLA**, J. Boronat, J. Casulleras
Momentum Distribution of Quantum Liquids at Finite Temperature
J. Low Temp. Phys. 1547–1552, **126**, 2002 IF 1.139, Q2

3. **L. BRUALLA**, S. Fantoni, A. Sarsa, K. E. Schmidt, S. A. Vitiello
Spin-orbit induced backflow in neutron matter with auxiliary field diffusion Monte Carlo method
Phys. Rev. C. 065806, **67**, 2003 IF 2.708, Q2

4. **L. BRUALLA**, M.C. Gordillo
Liquid-gas transition of neon in quasi-one-dimensional environments
Phys. Rev. B. 075423, **68**, 2003 IF 2.962, Q1

5. **L. BRUALLA**, K. Sakkos, J. Boronat, J. Casulleras
Higher order and infinite Trotter–number extrapolations in path integral Monte Carlo
J. Chem. Phys. 636–643, **121**, 2004 IF 3.105, Q1

6. M. C. Gordillo, **L. BRUALLA**, S. Fantoni
Neon adsorbed in carbon nanotube bundles
Phys. Rev. B 245420, **70**, 2004 IF 3.075, Q1
(Paper selected for the January 10, 2005 issue of Virtual Journal of Nanoscale Science and Technology, an American Institute of Physics and American Physical Society publication. http://www.vjnano.org)

7. Balázs Hetényi, **L. BRUALLA**, S. Fantoni
Quantum Monte Carlo Algorithm Based on Two-Body Density Functional Theory for Fermionic Many-Body Systems: Application to ^{3}He
Phys. Rev. Lett. 170202, **93**, 2004 IF 6.372, Q1

8. P. Kowalzcyk, **L. BRUALLA**, A. Zywocinski, S. Bathia
Single-walled carbon nanotubes: Efficient nanomaterials for separation and on-board vehicle storage of hydrogen and methane mixture at room temperature?
J. Phys. Chem. C 5250–5257, **111**, 2007 IF 3.396, Q1

9. J.M. Fernandez-Varea, P. Carrasco, V. Panettieri, **L. BRUALLA**
Monte Carlo based water/medium stopping-power ratios for different ICRP and ICRU tissues
Phys. Med. Biol. 6475–6483, **52**, 2007 IF 2.528, Q1

10. P. Kowalczyk, **L. BRUALLA**, P.A. Gauden, A.P. Terzyk
Static and thermodynamic properties of low-density supercritical ^{4}He—breakdown of the Feynman-Hibbs approximation
Phys. Chem. Chem. Phys. 9182–9187, **11**, 2009 IF 4.116, Q1

11. N.L. Maidana, **L. BRUALLA**, J.R. Oliveira, M.A. Rizzutto, N. Added, J.M. Fernández-Varea, V.R. Vanin
Observation of double electron-positron pair production by γ rays reexamined
Phys. Rev. C, 048501, **79**, 2009 IF 3.477, Q1

12. **L. BRUALLA**, F. Salvat, R. Palanco-Zamora
Efficient Monte Carlo simulation of multileaf collimators using geometry-related variance-reduction techniques
Phys. Med. Biol. 4131–4149, **54**, 2009 IF 2.781, Q1

13. V. Panettieri, P. Barsoun, M. Westermark, **L. BRUALLA**, I. Lax
AAA and PB calculation accuracy in the surface build-up region in tangential beam treatments. Phantom and breast case study with the Monte Carlo code PENELOPE
Radiother. Oncol. 94–101, **93**, 2009 IF 4.343, Q1

14. **L. BRUALLA**, R. Palanco-Zamora, A. Wittig, J. Sempau, W. Sauerwein
Comparison between PENELOPE *and electron Monte Carlo simulations of electron fields used in the treatment of the conjunctival lymphoma*
Phys. Med. Biol. 5469–5481, **54**, 2009 IF 2.781, Q1

15. A. Isambert, **L. BRUALLA**, D. Lefkopoulos
Evaluation of the material assignment method used by a Monte Carlo treatment planning system
Cancer Radiother. 744–746, **13**, 2009 IF 1.438, Q3

16. G. Bueno, O. Déniz, C.B. Carrascosa, J.M. Delgado, **L. BRUALLA**
Fast Monte Carlo simulation on a voxelized human phantom deformed to a patient
Med. Phys. 5162–5174, **36**, 2009 IF 2.704, Q2

17. A. Isambert, **L. BRUALLA**, M. Benkebil, D. Lefkopoulos
Determination of the optimal statistical uncertainty to perform electron-beam Monte Carlo absorbed dose estimation in the target volume
Cancer Radiother. 89–95, **14**, 2010 IF 1.306, Q3

18. N.L. Maidana, **L. BRUALLA**, V.R. Vanin, J.R.B. Oliveira, M.A. Rizzutto, E. do Nascimento,

J.M. Fernández-Varea
Triple- and quadruple-escape peaks in HPGe detectors: Experimental observation and Monte Carlo simulation
Nucl. Instrum. Meth. A, 285–294, **615**, 2010 IF 1.142, Q3

19. **L. BRUALLA**
Optimización y planificación del tratamiento en radioterapia con campos de radiación pequeños por medio de métodos Monte Carlo
Sanid. Mil. 83–96, **66**, 2010

20. **L. BRUALLA**, W. Sauerwein
On the efficiency of azimuthal and rotational splitting for Monte Carlo simulation of clinical linear accelerators Radiat. Phys. Chem. 929–932, **79**, 2010 IF 1.132, Q3

21. S. García-Pareja, P. Galán, F. Manzano, **L. BRUALLA**, A.M. Lallena
Ant colony algorithm implementation in electron and photon Monte Carlo transport: Application to the commissioning of radiosurgery photon beams
Med. Phys. 3782–3790, **37**, 2010 IF 3.075, Q1

22. A. Wittig, S. Sheu-Grabellus, L. Collette, R. Moss, **L. BRUALLA**, W. Sauerwein
BPA uptake does not correlate with LAT1 and Ki67 expressions in tumor samples (results of EORTC trial 11001)
Appl. Radiat. Isotopes 1807–1812, **69**, 2011 IF 1.172, Q3

23. **L. BRUALLA**, R. Palanco-Zamora, K.-P. Steuhl, N. Bornfeld, W. Sauerwein
Monte Carlo simulations applied to conjunctival lymphoma radiotherapy treatment
Strahlenther. Onkol. 492–498, **187**, 2011 IF 3.561, Q1
(Cover article)

24. J. Sempau, A. Badal, **L. BRUALLA**
A PENELOPE-based system for the automated Monte Carlo simulation of clinacs and voxelized geometries—application to far-from-axis fields
Med. Phys. 5887–5895, **38**, 2011 IF 2.830, Q1
(Paper selected for the October 15, 2011 issue of Virtual Journal of Biological Physics Research, an American Institute of Physics and American Physical Society publication. http://www.vjbio.org)

25. **L. BRUALLA**, F.J. Zaragoza, J. Sempau, A. Wittig, W. Sauerwein
Electron irradiation of conjunctival lymphoma—Monte Carlo simulation of the minute dose distribution and technique optimization
Int. J. Radiat. Oncol. Biol. Phys. 1330–1337, **83**, 2012 IF 4.524, Q1

26. M. Rodriguez, J. Sempau, **L. BRUALLA**
A combined approach of variance-reduction techniques for the efficient Monte Carlo simulation of linacs
Phys. Med. Biol. 3013–3024, **57**, 2012 IF 2.701, Q2

27. **L. BRUALLA**, P.A. Mayorga, A. Flühs, A.M. Lallena, J. Sempau, W. Sauerwein
Retinoblastoma external beam photon irradiation with a special 'D'-shaped collimator: a comparison between measurements, Monte Carlo simulation and a treatment planning system calculation
Phys. Med. Biol. 7741–7751, **57**, 2012 IF 2.701, Q2

28. **L. BRUALLA**, J. Sempau, F.J. Zaragoza, A. Wittig, W. Sauerwein
Accurate estimation of dose distributions inside an eye irradiated with ^{106}Ru plaques

Strahlenther. Onkol. 68–73, **189**, 2013 IF 2.733, Q2
(Cover article)

29. M. Rodriguez, J. Sempau, **L. BRUALLA**
PRIMO: A graphical environment for the Monte Carlo simulation of Varian and Elekta linacs
Strahlenther. Onkol. 881–886, **189**, 2013 IF 2.733, Q2

30. N.L. Maidana, V.R. Vanin, V. Jahnke, J.M. Fernández-Varea, M.N. Martins, **L. BRUALLA**
Efficiency calibration of x-ray HPGe detectors for photons with energies above Ge K binding energy
Nucl. Instrum. Meth. A, 371–380, **729**, 2013 IF 1.316, Q3

31. Ophthalmologic Oncology Task Force (group of authors)
The American Brachytherapy Society consensus guidelines for plaque brachytherapy of uveal melanoma and retinoblastoma
Brachytherapy, 1–14, **13**, 2014 IF 2.758, Q2

32. P.A. Mayorga, **L. BRUALLA**, W. Sauerwein, A.M. Lallena
Monte Carlo study for designing a dedicated "D"-shaped collimator used in the external beam radiotherapy of retinoblastoma patients
Med. Phys. 011714 (pp. 12), **41**, 2014 IF 2.635, Q2

33. M.F. Belosi, M. Rodriguez, A. Fogliata, L. Cozzi, J. Sempau, A. Clivio, G. Nicolini, E. Vanetti, H. Krauss, C. Khamphan, P. Fenoglietto, J. Puxeu, D. Fedele, P. Mancosu, **L. BRUALLA**
Monte Carlo simulation of TrueBeam flattening-filter-free beams using Varian phase-space files: Comparison with experimental data
Med. Phys. 051707 (pp. 11), **41**, 2014 IF 2.635, Q2

34. F. Erazo, **L. BRUALLA**, A. Lallena
Electron beam quality $k_{\mathrm{Q},\mathrm{Q}_0}$ factors for various ionization chambers: a Monte Carlo investigation with PENELOPE
Phys. Med. Biol. 6673–6691, **59**, 2014 IF 2.761, Q2

35. M. Hermida-López, L. Lüdemann, A. Flühs, **L. BRUALLA**
Technical Note: Influence of the phantom material on the absorbed-dose energy dependence of the EBT3 radiochromic film for photons in the energy range 3 keV–18 MeV
Med. Phys. 112103 (pp. 6), **41**, 2014 IF 2.635, Q2

36. **L. BRUALLA**, F. Zaragoza, W. Sauerwein
Monte Carlo simulation of the treatment of eye tumors with ^{106}Ru plaques: a study on maximum tumor height and eccentric placement
Ocul. Oncol. Pathol. 2–12, **1**, 2015 IF 0.47 (SJR Scopus), Q2

37. **L. BRUALLA**, N.L. Maidana, V.R. Vanin
Determination of the detection efficiency of a planar HPGe detector with a non-uniform frontal dead layer
X-Ray Spectrom. 89–92, **44**, 2015 IF 1.254, Q3

38. M. Rodriguez, J. Sempau, A. Fogliata, L. Cozzi, W. Sauerwein, **L. BRUALLA**
A geometrical model for the Monte Carlo simulation of the TrueBeam linac
Phys. Med. Biol. N219–N229, **60**, 2015 IF 2.811, Q1

39. M. Rodriguez, J. Sempau, **L. BRUALLA**
Technical Note: Study of the electron transport parameters used in PENELOPE for the Monte

Carlo simulation of linac targets
Med. Phys. 2877–2881, **42**, 2015 IF 2.496, Q2

40. N.L. Maidana, V.R. Vanin, J.A. Garcia-Alvarez, M. Hermida-Lopez, **L. BRUALLA**
Experimental HPGe coaxial detector response and efficiency compared to Monte Carlo simulations
Appl. Radiat. Isotopes 64–74, **108**, 2016 IF 1.128, Q2

41. P.A. Mayorga, **L. BRUALLA**, A. Flühs, W. Sauerwein, A.M. Lallena
Testing Monte Carlo absolute dosimetry formalisms for a small field 'D'-shaped collimator used in retinoblastoma external beam radiotherapy
Biomed. Phys. Eng. Express 065008 (pp 1–11), **2**, 2016 IF 0.20 (SJR Scopus), Q3

42. F. Zaragoza, M. Eichmann, D. Flühs, W. Sauerwein, **L. BRUALLA**
Monte Carlo estimation of absorbed dose distributions obtained from heterogeneous ^{106}Ru eye plaques
Ocul. Oncol. Pathol. 204–209, **3**, 2017 IF 0.47 (SJR Scopus), Q2

43. M. Hermida-López, **L. BRUALLA**
Technical Note: Monte Carlo study of ^{106}Ru/^{106}Rh ophthalmic plaques including the ^{106}Rh gamma spectrum
Med. Phys. 2581–2585, **44**, 2017 IF 2.884, Q2

44. F. Erazo, **L. BRUALLA**, A.M. Lallena
Computation of the electron beam quality $k_{\mathrm{Q},\mathrm{Q}_0}$ factors for the NE2571, NE2571A and NE2581A thimble ionization chambers using PENELOPE
Phys. Medica 76–80, **38**, 2017 IF 2.240, Q2

45. **L. BRUALLA**, F. Vollmer, E. Tokmak, W. Sauerwein
Robotics and computer science in medical education
Proceedings of the International Conference e-health, 161–165, 2017

46. M. Rodriguez, **L. BRUALLA**
Many-integrated core (MIC) technology for accelerating Monte Carlo simulation of radiation transport: A study based on the code DPM
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Monte Carlo simulation of a Varian's TrueBeam linac as a Clinac 2100: A feasibility study
Radiother. Oncol. S740, Suppl., **152**, 2020

64. M.R. Wette, T. Steinmeier, Y. Lin, N. Journy, T. Tran, A. Jackson, S. Bolle, B. Fresneau, Y. Lassen-Ramshad, L. Tram Henriksen, K. Haustermans, **L. BRUALLA**, C. Bäumer, C. Demoor-Goldschmidt, J. Thariat, I. Thierry-Chef, B. Timmermann
Endocrine Late-Effects after Childhood and Adolescent Cancer-The Pan-European Registry HARMONIC
Radiother. Oncol. S1180, Suppl., **161**, 2021

65. M.R. Wette, T. Steinmeier, Y.L. Lin, N. Journy, A. Dumas, S. Bolle, Y. Lassen-Ramshad, K. Haustermans, **L. BRUALLA**, C. Demoor-Goldschmidt, L. Walsh, S. Haghdoost, I. Thierry-Chef, B. Timmermann
Establishment of a pan-European Platform for the Investigation of Health Consequences of medical Radiation on Childhood and Adolescent Cancer Patients-The EU Project
Strahlenther. Onkol. S33, Suppl., **198**, 2022

66. I. Thierry-Chef, B. Timmermann, N. Journy, M. Bernier, R. Mcnally, J. Dabin, **L. BRUALLA**, S. Haghdoost, A. Sarukan, E. Cardis, M. Hierath, G. Frija
Understanding late effects of radiation exposure in paediatrics: The HARMONIC and MEDI-RAD projects
Radiother. Oncol. S11, Suppl., **182**, 2023

OTHER PUBLICATIONS

1. **L. BRUALLA** cello performer.
Book and CD “13 Cançons Tradicionals Catalanes” (13 Traditional Catalan Songs)
Arrangements by: J.C. Martínez i Prat.
Els llibres del Set-ciències, Spain. 2001. ISBN 84-95526-02-6

2. **L. BRUALLA**, R. Palanco-Zamora, M.A. Duch, J. Sempau
International Atomic Energy Agency (IAEA)
Phase-space database for external beam radiotherapy
Contributed PSF: Varian 2100 C/D, 6 MeV, 10×10 cm^2
Available at: http://www-nds.iaea.org/phsp/electron1/
March 2011

3. **L. BRUALLA**, R. Palanco-Zamora, M.A. Duch, J. Sempau
International Atomic Energy Agency (IAEA)
Phase-space database for external beam radiotherapy
Contributed PSF: Varian 2100 C/D, 6 MeV, 15×15 cm^2
Available at: http://www-nds.iaea.org/phsp/electron1/
March 2011

4. **L. BRUALLA**, R. Palanco-Zamora, M.A. Duch, J. Sempau
International Atomic Energy Agency (IAEA)
Phase-space database for external beam radiotherapy
Contributed PSF: Varian 2100 C/D, 9 MeV, 10×10 cm^2
Available at: http://www-nds.iaea.org/phsp/electron1/
March 2011

5. **L. BRUALLA**, R. Palanco-Zamora, M.A. Duch, J. Sempau
International Atomic Energy Agency (IAEA)
Phase-space database for external beam radiotherapy
Contributed PSF: Varian 2100 C/D, 9 MeV, 15×15 cm^2
Available at: http://www-nds.iaea.org/phsp/electron1/
March 2011

6. **L. BRUALLA**, R. Palanco-Zamora, M.A. Duch, J. Sempau
International Atomic Energy Agency (IAEA)
Phase-space database for external beam radiotherapy
Contributed PSF: Varian 600 C, 6 MV, 10×10 cm^2
Available at: http://www-nds.iaea.org/phsp/photon1/
March 2011

7. **L. BRUALLA**, R. Palanco-Zamora, M.A. Duch, J. Sempau
International Atomic Energy Agency (IAEA)
Phase-space database for external beam radiotherapy
Contributed PSF: Varian 600 C, 6 MV, 1×1 cm^2
Available at: http://www-nds.iaea.org/phsp/photon1/
March 2011

8. **L. BRUALLA**, M. Rodriguez, J. Sempau
PRIMO (Monte Carlo code for the simulation of linacs and dose distributions)
Available at: http://www.primoproject.net
Currently more than 2,300 users at 1,500 institutions worldwide
Publicly distributed since September 2013

Last version: 0.3.1.1772

9. **L. BRUALLA**, M. Rodriguez, J. Sempau
Technical document: PRIMO User's Manual
Number of pages: 84
Available at: http://www.primoproject.net

10. **L. BRUALLA**, M. Rodriguez, J. Sempau
Technical document: PRIMO Quick start guide
Number of pages: 10
Available at: http://www.primoproject.net

11. **L. BRUALLA**, M. Rodriguez, J. Sempau
Technical document: PRIMO User's Manual. Version 0.3.1.1600
Number of pages: 88
Available at: http://www.primoproject.net

12. **L. BRUALLA**, M. Rodriguez, J. Sempau, P. Andreo
PENELOPE/PRIMO-calculated photon spectra from clinical accelerators
Calculated nominal energies: 4 MV, 6 MV, 6 MV-FFF, 10 MV, 10 MV-FFF, 15 MV, 18 MV, 20 MV
Available at: https://www.primoproject.net/primo/EnergySpectra

13. **L. BRUALLA**, M. Rodriguez, J. Sempau, P. Andreo
PENELOPE/PRIMO-calculated electron spectra from clinical accelerators
Calculated nominal energies: 6 MeV, 12 MeV, 18 MeV, 22 MeV
Available at: https://www.primoproject.net/primo/EnergySpectra

14. **L. BRUALLA**, M. Rodriguez, J. Sempau
YouTube PRIMO channel with PRIMO tutorials
Available at: https://www.youtube.com/channel/UCzY2mc0cOtF0cvAcyrLDTwg

PUBLISHED ORAL PRESENTATIONS

Note: only oral presentations given by the applicant appear in this section.

1. **L. BRUALLA**, R. Palanco-Zamora, A. Flühs, W. Sauerwein
Estimation of the absorbed dose from electron beams to treat conjunctival lymphoma using a fast Monte Carlo algorithm
Strahlenther. Onkol. 50, Suppl. 1, **185**, 2009.
Deutsche Gesellschaft für Radioonkologie (DEGRO)
Bremen, Germany

2. **L. BRUALLA**, W. Sauerwein
A code for the automatic Monte Carlo simulation of linacs using PENELOPE
Strahlenther. Onkol. 50, Suppl. 1, **185**, 2009.
Deutsche Gesellschaft für Radioonkologie (DEGRO)
Bremen, Germany

3. **L. BRUALLA**, R. Palanco-Zamora, A. Wittig, J. Sempau, W. Sauerwein
PENELOPE simulation of small annular electron fields used for the treatment of the conjunctival lymphoma
In: Programme and Abstract Book 30–32, October 2009
European Workshop on Monte Carlo Treatment Planning
Cardiff, United Kingdom

4. **L. BRUALLA**, M. Rodriguez, J. Sempau
PRIMO: A graphical environment for the automatic simulation of Varian and Elekta linacs with PENELOPE
Radiother. Oncol. S246, Suppl 1, **103**, 2012.
ESTRO 31 (European Society for Radiotherapy and Oncology)
Barcelona, Spain

5. **L. BRUALLA**, M. Rodriguez, J. Sempau
PRIMO: A graphical user-friendly environment for the automatic Monte Carlo simulation of linacs and dose distributions in patients
In: Programme and Book of Abstracts, p. 174, May 2012.
3rd European Workshop on Monte Carlo Treatment Planning MCTP2012
Seville, Spain

6. **L. BRUALLA**, F.J. Zaragoza, J. Sempau, D. Flühs, L. Lüdemann, B. Zimmermann, A. Wittig, W. Sauerwein
Innovative Monte Carlo simulations for the accurate estimation of absorbed dose at organs at risk and the dose distribution in the eye treated with Ru-106 plaques
Strahlenther. Onkol. 11, Suppl. 1, **188**, 2012.
Deutsche Gesellschaft für Radioonkologie (DEGRO)
Wiesbaden, Germany

7. **L. BRUALLA**, P.A. Mayorga, A. Flühs, J. Sempau, A. Wittig, A.M. Lallena, W. Sauerwein
Evaluation of the retinoblastoma treatment: Small off-axis photon fields assessed with experiments, PENELOPE and Eclipse
Strahlenther. Onkol. 42, Suppl. 1, **188**, 2012.
Deutsche Gesellschaft für Radioonkologie (DEGRO)
Wiesbaden, Germany

8. **L. BRUALLA**, M. Rodriguez, J. Sempau
PRIMO: a graphical environment for the automatic simulation of linacs and dose distributions in patients with PENELOPE
In: Program and Abstracts, November 2012.
QSMC 2012. Quantum scattering codes and Monte Carlo simulations to model dynamical processes in biosystems
Madrid, Spain

9. **L. BRUALLA**, W. Sauerwein
A fuzzy logic algorithm for automatic medium composition determination of computerised tomography images. Application to Monte Carlo simulation of radiation transport in computerised tomography images of patients
Strahlenther. Onkol. 6, Suppl. 1, **189**, 2013.
(Selected as highlight conference)
Deutsche Gesellschaft für Radioonkologie (DEGRO)
Berlin, Germany

10. **L. BRUALLA**, F.J. Zaragoza, M. Eichmann, D. Flühs, W. Sauerwein
Absorbed dose distributions obtained from inhomogeneous Ru-106 eye plaques using Monte Carlo simulation
Strahlenther. Onkol. 47, Suppl., **192**, 2016.
Deutsche Gesellschaft für Radioonkologie (DEGRO)
Mannheim, Germany

11. **L. BRUALLA**, F. Vollmer, E. Tokmak, W. Sauerwein

Robotics and computer science in medical education
In: Proceedings of the 9th International Conference e-health, 161–165, 2017
Multi Conference on Computer Science and Information Systems (MCCSIS)
Lisbon, Portugal

12. **L. BRUALLA**, M. Rodriguez, A.M. Lallena
Review of Monte Carlo codes applied to radiation therapy
In book of abstracts: Workshop on the Monte Carlo radiotherapy system PRIMO, 15, 2017
Essen, Germany

13. **L. BRUALLA**
Complete patient exposure during paediatric brain cancer treatment for photon and proton therapy techniques including imaging procedures
In book of abstracts: International Society of Radiation Epidemiology and Dosimetry, 1st meeting https://radiation.isglobal.org/isored/HTML/index.html, May 2023
Sitges, Spain

14. **L. BRUALLA**
Complete patient exposure from radiotherapy procedures and reduction of second primary cancer risk
In book of abstracts: 7th Translational Oncology Symposium ETOS, March 2024
Essen, Germany

INVITED ORAL PRESENTATIONS

1. **L. BRUALLA**, J. Boronat, J. Casulleras
The path integral Monte Carlo method
Departament de Física Fonamental. Facultat de Física
Universitat de Barcelona
Barcelona, Spain
March 2001

2. **L. BRUALLA**, J. Boronat, J. Casulleras
The trail method for momentum distributions
Centre Européen de Calcul Atomique et Moléculaire
École Normale Supérieure.
Lyon, France
October 2001

3. **L. BRUALLA**, F. Salvat
Efficient Monte Carlo simulation of multileaf collimators
Ospedale Careggi. Università degli Studi di Firenze
Florence, Italy
May 2006

4. **L. BRUALLA**
Simulación aplicada al tratamiento con radioterapia
Universidad de Castilla–La Mancha
Ciudad Real, Spain
January 2007

5. **L. BRUALLA**, F. Salvat
Monte Carlo simulation for radiotherapy treatment planning
Institut d'Estudis Catalans

Barcelona, Spain
July 2007

6. **L. BRUALLA**, F. Salvat
Fast Monte Carlo simulation applied to radiotherapy treatment planning
Universidad de Castilla–La Mancha
Ciudad Real, Spain
February 2008

7. **L. BRUALLA**, F. Salvat, E. Franchisseur, S. García-Pareja, A. Lallena
Advanced variance-reduction techniques applied to Monte Carlo simulation of linacs
MAESTRO project international conference on use of Monte Carlo codes in radiotherapy
Institut Gustave Roussy
Villejuif, France
April 2008

8. **L. BRUALLA**
Clinical applications of PENELOPE
Laboratório de Ciências Radiológicas
Universidade do Estado do Rio de Janeiro
Rio de Janeiro, Brazil
October 2008

9. **L. BRUALLA**
Advanced variance-reduction techniques
Laboratório de Ciências Radiológicas
Universidade do Estado do Rio de Janeiro
Rio de Janeiro, Brazil
October 2008

10. **L. BRUALLA**
Monte Carlo simulation applied to eye cancer treatments
Institut de Tècniques Energètiques. Universitat Politècnica de Catalunya
Barcelona, Spain
November 2012

11. **L. BRUALLA**
Introduction to treatment planning in external beam radiotherapy using Monte Carlo simulation
European Master in Nuclear Applications
FH Aachen University of Applied Sciences
Jülich, Germany
November 2014

12. **L. BRUALLA**
Monte Carlo simulation with the PENELOPE code of radiation detection systems
Advancements in Nuclear Instrumentation Measurement Methods and their Applications. ANIMMA 2015
Lisbon Congress Center
Lisbon, Portugal
April 2015

13. **L. BRUALLA**
PRIMO: a graphical system for the Monte Carlo simulation of Varian and Elekta linacs
Treffen der AKs “Computer in der Radioonkologie” und “Monte Carlo”

Deutsche Gesellschaft für Medizinische Physik. DGMP
Uniklinik Köln, Germany
May 2015

14. **L. BRUALLA**, W. Sauerwein
How to teach robotics to medical students
Japanese and German Cutting Edge Technologies for Patient Care
1st NRW-Fukushima Joint Symposium on Advances in Medicine
Universität Duisburg-Essen, Germany
September 2016

15. **L. BRUALLA**
Review of Monte Carlo systems used for conventional external beam radiotherapy
Treffen des AK Monte Carlo
Deutsche Gesellschaft für Medizinische Physik. DGMP
Heidelberger Ionentherapiezentrum, Germany
October 2017

16. **L. BRUALLA**
Electron accelerator modeling with PENELOPE and tutorial
OMA School on Monte Carlo Simulations
Optimization of Medical Accelerators: A Marie Skłodowska-Curie European Training Network
Ludwig-Maximilians-Universität München, Germany
November 2017

17. **L. BRUALLA**, W. Sauerwein
The need to teach robotics to students in medicine and how to do it
Advances in medicine through technological innovation
2nd NRW-Fukushima Joint Symposium on Advances in Medicine
Southern Tohoku General Hospital, Japan
December 2017

18. **L. BRUALLA**
Session de perfectionnement: Review of Monte Carlo systems applied to conventional external beam radiotherapy
57emes Journées Scientifiques. Société Francaise de Physique Medicale
Toulouse, France
June 2018

19. **L. BRUALLA**
Review of Monte Carlo treatment planning and dose verification systems for conventional external beam radiotherapy
XXIII Brazilian Congress on Medical Physics
Porto Alegre, Brazil
September 2018

20. **L. BRUALLA**
Beschleunigerkopf-Simulationen (Simulación de aceleradores)
AK19: Arbeitkreis Monte Carlo Simulationen der Deutschen Gesellschaft für Medizinische Physik (DGMP)
Physikalisch-Technische Bundesanstalt (PTB), Germany
October 2019

21. **L. BRUALLA**

Teaching lecture: Condensed history in different codes
AK19: Arbeitkreis Monte Carlo Simulationen der Deutschen Gesellschaft für Medizinische Physik (DGMP)
Physikalisch-Technische Bundesanstalt (PTB), Germany
October 2019

22. **L. BRUALLA**
Monte Carlo simulation applied to radiotherapy
Sitzung des Ausschusses „Strahlenrisiko“ der Geschäftsstelle der Strahlenschutzkommission beim Bundesamt für Strahlenschutz, Germany
November 2019

23. **L. BRUALLA**
Monte Carlo simulation of dosimetry problems in proton therapy
International Medical Physics Week (IMPW)
Online meeting of the IOMP due to COVID. https://www.iomp.org/iomp-school-on-impw-2020-program/ May 2020

24. **L. BRUALLA**, M. Rodriguez, J. Sempau
PRIMO: A self-contained Monte Carlo system for linac simulation and patient dosimetry
Varian Webinars.
March 2021

25. **L. BRUALLA**
Humanoids in pediatric radiooncology
Paediatric Radiation Oncology Society Congress
Haus der Technik, Essen, Germany
June 2022

26. **L. BRUALLA**, A. Heine
Roboter unterstützt Kinder bei der Strahlentherapie
Gesellschaft für Qualitätsmanagement in der Gesundheitsversorgung e. V.
Universitätsklinikum Essen, Germany
June 2022

27. **L. BRUALLA**, Javier Vijande, Carles Domingo
Round table on Monte Carlo applications to radiotherapy
Congreso Bienal de la Sociedad Española de Física Médica, Spain
May 2023

OTHERS

- Certified Amateur Radio Operator. Call sign EA3IEB since November 2018
  Licence issued by the Spanish Ministry of Economy according to the
  CEPT (European Conference of Postal and Telecommunications Administrations) recommendation T/R 61-01.
  CW (Morse) operator. CW Academy Advanced level completed on February 2023. Advisor of the CW Academy since May 2023. CW Ops member #3309
- *Alférez de Navío* (NATO OFFICER-1) in the active reserve of the Armada Española (Spanish Navy)
  Unit: Fleet maintenance. Arsenal de Las Palmas, Gran Canaria, Spain
  Rank awarded in resolutions 632/18136/05 and 631/00935/25 of the Boletín Oficial de Defensa numbers 227/2005 and 16/2025
  Since November 2005
  - Certified NCAGS Officer (Naval Co-operation and Guidance for Shipping). Resolution 632/20546/23 of the Boletín Oficial de Defensa. November 2023.
  - Meteorologist Officer of Chief Staff in minesweeping NATO exercise Spanish MINEX 24. Resolution 631/05064/24 of the Boletín Oficial de Defensa. April–May 2024.
  - AWNIS LO (Allied Worldwide Navigational Information System Liaison Officer) of Chief Staff in Dynamic Mariner NATO exercise 25. Resolution 631/18450/24 of the Boletín Oficial de Defensa. March–April 2025.
  - Meteorologist Officer of Chief Staff in minesweeping NATO exercise Spanish MINEX 24. Resolution 631/18451/24 of the Boletín Oficial de Defensa. April–May 2025.
- *Capitán de Yate* (Yacht Captain)
  Title that allows the command of recreational motor and sailing vessels without any limitation of ship length, engine power or distance to coast.
  Title awarded by the Spanish Government through the Catalan Government.
  First place in the promotion.
  More than 20,000 nautical miles sailed single-handed or with reduced crew.
  Since July 2002

TEACHING PORTFOLIO

1 Personal details

Name	Prof. Dr. Lorenzo Brualla
Address	Hohlweg 24, 45147 Essen, Germany
Mobile phone	+34 690 913 263
Email address	lorenzo.brualla@uni-due.de
Level of qualification	Professor of the Medical Faculty of the University of Duisburg-Essen
Field or profession	Physicist
Current teaching	Instructor of 1 elective course at the Medical Faculty
Current supervision	Supervisor of 3 ongoing doctoral theses at the Medical Faculty

2 Teaching CV

2.1 Teaching qualifications

Type of course	**Name of course**	**Time period**	**Institution**
Formal education via a course in university pedagogy or equivalent	*Lehren Lernen—Plenardidaktik* Pedagogy course. Requirement for the *venia legendi*	17-18.06.2011 18 hours	University Duisburg-Essen, Medical Faculty

2.2 Teaching experience

Courses taught at the Universität Duisburg-Essen	**Course code Number of hours Type of course**	**Period**	**Role**	**Total number of hours**
Robotics and programming with Lego: An introductory course to robotics and programming for medical students	132108540 40 hours Blockseminar	Twice a year since SS 17	Unique instructor	535
Monte Carlo simulation of radiation transport with the general-purpose code Monte Carlo PENELOPE	132108510 40 hours Blockseminar	WS 10/11 WS 11/12	Unique instructor	80
Radiotherapy treatment planning with the Monte Carlo code PENELOPE	132108512 40 hours Blockseminar	WS 11/12	Unique instructor	40
Applied mathematics for radiation oncology	132108508 40 hours Blockseminar	WS 09/10	Unique instructor	40

Note 1: WS stands for winter semester. SS stands for summer semester.

Note 2: The hours indicated in the courses in which the applicant was not the unique instructor, correspond to the hours taught by L. Brualla.

Note 3: The “Total number of hours” column indicates the hours taught by the applicant since the beginning of the course.

Courses taught at other universities	**Course code** **Number of hours** **Type of course**	**Period**
Instructor of Master in Physics Seminario de invitados Universidad de Granada, Spain	 3 hours Lesson	Dec 2022
Instructor of the PENELOPE course OMA School on Monte Carlo Simulations Ludwig-Maximilians-Universität München, Germany	 4 hours Lesson	Nov 2017
Instructor of the Official PENELOPE course Nuclear Energy Agency (NEA) Universitat de Barcelona, Spain	 4 hours Lesson	Jun 2009
Instructor of the Ph.D. course: *Simulation of electron and photon transport with the program PENELOPE* Universidade de São Paulo, Brazil	FEP790 10 hours Lesson	Oct 2008
Unique instructor of the Ph.D. course: *PENELOPE Workshop: Simulating linacs* Dept. of Medical Imaging and Radiological Sciences Chang Gung University, Taipei, Taiwan	 40 hours Blockseminar	Jan 2008
Unique instructor of the course ‘Physics II for Engineers’ (Lectures, problems, laboratory) College of Science, Sultan Qaboos University, Oman	PHYS 2108 120 hours Course	WS 07/08
Unique instructor of the course ‘Physics I for Engineers’ (Problems, laboratory) College of Science, Sultan Qaboos University, Oman	PHYS 2107 90 hours Course	WS 07/08
Unique instructor of the course ‘Control and Modeling’ Departament d’Enginyeria de Sistemes, Automàtica i Informàtica Industrial Universitat Politècnica de Catalunya. Barcelona, Spain	23452 64 hours Course	WS 98/99 SS 99
Instructor of the course ‘Physics Laboratory’ Departament de Física i Enginyeria Nuclear Universitat Politècnica de Catalunya. Barcelona, Spain	270003 128 hours Course	WS 99/00 WS 00/01 WS 01/02

2.3 Breadth or variation in teaching experience

Type of course	Scope	Target group	When	Role	Institution
Lectures and hands-on	Programming	Undergraduates	2017–present	Unique instructor	University Duisburg-Essen
Lectures and hands-on	Monte Carlo simulation	Undergraduates	2010–2012	Unique instructor	University Duisburg-Essen
Lectures and hands-on	Radiotherapy simulation	Undergraduates	2011–2012	Unique instructor	University Duisburg-Essen
Lectures	Mathematics	Undergraduates	2009	Unique instructor	University Duisburg-Essen
Lectures and hands-on	Monte Carlo simulation	Postgraduates Researchers	2017	Instructor	Ludwig-Maximilians University
Lectures and hands-on	Monte Carlo simulation	Postgraduates Researchers	2009	Instructor	University of Barcelona
Lectures and hands-on	Monte Carlo simulation	Undergraduates	2008	Instructor	University of São Paulo
Lectures and hands-on	Monte Carlo simulation	Postgraduates	2008	Unique instructor	Chang Gung University
Lectures, problems, laboratory	Physics (electromagnetism)	Undergraduates	2007	Unique instructor	Sultan Qaboos University
Problems, laboratory	Physics (mechanics)	Undergraduates	2007	Unique instructor	Sultan Qaboos University
Computer laboratory	Automation and control	Undergraduates	1998–2000	Unique instructor	Technical U. of Catalonia
Laboratory	Physics (electromagnetism)	Undergraduates	1999–2002	Instructor	Technical U. of Catalonia

2.4 Supervision experience

2.4.1 Supervision of PhD students

FINALIZED PhD THESES

1. **Student**: Paola Andrea Mayorga
Thesis title: *Optimización de la radioterapia externa del retinoblastoma por medio de simulación Monte Carlo con el código PENELOPE* (Optimization of the retinoblastoma external beam radiotherapy by means of Monte Carlo simulation with the PENELOPE code)
Mark: Excellent Cum Laude (best possible mark in Spain)
University: Universidad de Granada, Spain
Supervisors: Prof. Dr. Antonio M. Lallena and Priv.-Doz. Dr. Lorenzo Brualla
Date of the viva: September 24, 2015
url: http://hdl.handle.net/10481/40896
Peer-reviewed articles published in relation to the thesis:

1. L. Brualla, P.A. Mayorga, A. Flühs, A.M. Lallena, J. Sempau, W. Sauerwein
Retinoblastoma external beam photon irradiation with a special 'D'-shaped collimator: a comparison between measurements, Monte Carlo simulation and a treatment planning system calculation. Phys. Med. Biol. 7741–7751, **57**, 2012

2. P.A. Mayorga, L. Brualla, W. Sauerwein, A.M. Lallena
Monte Carlo study for designing a dedicated "D"-shaped collimator used in the external beam radiotherapy of retinoblastoma patients. Med. Phys. 011714 (pp. 12), **41**, 2014

3. P.A. Mayorga, L. Brualla, A. Flühs, W. Sauerwein, A.M. Lallena
Testing Monte Carlo absolute dosimetry formalisms for a small field 'D'-shaped collimator used in retinoblastoma external beam radiotherapy. Biomed. Phys. Eng. Express 065008 (pp. 11), **2**, 2016

2. **Student**: Miguel Lázaro Rodríguez Castillo
Thesis title: Automation of the Monte Carlo simulation of medical linear accelerators
Mark: Excellent Cum Laude (best possible mark in Spain)
University: Universitat Politècnica de Catalunya, Spain
Supervisors: Priv.-Doz. Dr. Lorenzo Brualla and Dr. Josep Sempau
Date of the viva: February 5, 2016
url: https://upcommons.upc.edu/handle/2117/96296
Peer-reviewed articles published in relation to the thesis:

1. M. Rodriguez, J. Sempau, L. Brualla
A combined approach of variance-reduction techniques for the efficient Monte Carlo simulation of linacs. Phys. Med. Biol. 3013–3024, **57**, 2012

2. M. Rodriguez, J. Sempau, L. Brualla
PRIMO: A graphical environment for the Monte Carlo simulation of Varian and Elekta linacs. Strahlenther. Onkol. 881–886, **189**, 2013

3. M.F. Belosi, M. Rodriguez, A. Fogliata, L. Cozzi, J. Sempau, A. Clivio, G. Nicolini, E. Vanetti, H. Krauss, C. Khamphan, P. Fenoglietto, J. Puxeu, D. Fedele, P. Mancosu, L. Brualla
Monte Carlo simulation of TrueBeam flattening-filter-free beams using Varian phase-space files: Comparison with experimental data. Med. Phys. 051707 (pp. 11), **41**, 2014

4. M. Rodriguez, J. Sempau, A. Fogliata, L. Cozzi, W. Sauerwein, L. Brualla
A geometrical model for the Monte Carlo simulation of the TrueBeam linac. Phys. Med. Biol. N219–N229, **60**, 2015

5. M. Rodriguez, J. Sempau, L. Brualla
Technical Note: Study of the electron transport parameters used in PENELOPE for the Monte Carlo simulation of linac targets. Med. Phys. 2877–2881, **42**, 2015

3. **Student**: Marcelino Hermida López
Thesis title: Improvements to the dosimetry of ^{106}Ru/^{106}Rh ophthalmic plaques: Monte Carlo simulations and radiochromic film measurements
Mark: Summa cum laude (mit Auszeichnung) (Best possible mark in Germany)

University: Universität Duisburg-Essen, Germany
Supervisor: Priv.-Doz. Dr. Lorenzo Brualla
Date of the viva: December 20, 2016
url: http://duepublico.uni-duisburg-essen.de/servlets/DocumentServlet?id=43110&lang=en
Peer-reviewed articles published in relation to the thesis:

1. M. Hermida-López
   Calculation of dose distributions for 12 ^{106}*Ru/*^{106}*Rh ophthalmic applicator models with the PENELOPE Monte Carlo code*. Med. Phys. 101705 (pp. 13), **40**, 2013

2. M. Hermida-López, L. Lüdemann, A. Flühs, L. Brualla
   Technical Note: Influence of the phantom material on the absorbed-dose energy dependence of the EBT3 radiochromic film for photons in the energy range 3 keV–18 MeV. Med. Phys. 112103 (pp. 6), **41**, 2014

3. N.L. Maidana, V.R. Vanin, J.A. Garcia-Alvarez, M. Hermida-Lopez, L. Brualla
   Experimental HPGe coaxial detector response and efficiency compared to Monte Carlo simulations. Appl. Radiat. Isotopes 64–74, **108**, 2016

4. M. Hermida-López, L. Brualla
   Technical Note: Monte Carlo study of ^{106}*Ru/*^{106}*Rh ophthalmic plaques including the* ^{106}*Rh gamma spectrum*. Med. Phys. 2581–2585, **44**, 2017

5. M. Hermida-López, L. Brualla
   Absorbed dose distributions from ophthalmic ^{106}*Ru/*^{106}*Rh plaques measured in water with radiochromic film*. Med. Phys. 1699–1707, **45**, 2018

4. **Student**: Francisco Zaragoza
Thesis title: Monte Carlo estimation of absorbed dose distributions in water and anthropomorphic phantoms obtained from homogeneous and heterogenous ^{106}Ru eye plaques
Mark: Cum laude
University: Universität Duisburg-Essen, Germany
Supervisor: Prof. Dr. Lorenzo Brualla
Date of the viva: April 22, 2021
Peer-reviewed articles published in relation to the thesis:

1. L. Brualla, F.J. Zaragoza, J. Sempau, A. Wittig, W. Sauerwein. Electron irradiation of conjunctival lymphoma—Monte Carlo simulation of the minute dose distribution and technique optimization. *Int. J. Radiat. Oncol. Biol. Phys.* **5**,

2. L. Brualla, J. Sempau, F.J. Zaragoza, A. Wittig, W. Sauerwein. Accurate estimation of dose distributions inside and eye irradiated with ^{106}Ru plaques. *Strahlenther. Onkol.* **189**, 78–73, 2013

3. L. Brualla, F.J. Zaragoza, W. Sauerwein. Monte Carlo simulation of the treatment of eye tumors with ^{106}Ru plaques: a study on maximum tumor height and eccentric placement. *Ocul. Oncol. Pathol.* **1**, 2–12, 2014

4. F.J. Zaragoza, M. Eichmann, D. Flühs, W. Sauerwein, L. Brualla. Monte Carlo estimation of absorbed dose distributions obtained from heterogeneous ^{106}Ru plaques. *Ocul. Oncol. Pathol.* **3**, 204–209, 2017

5. F.J. Zaragoza, M. Eichmann, D. Flühs, A. Wittig, W. Sauerwein, L. Brualla. Monte Carlo simulation of the treatment of uveal melanoma using measured heterogeneous ^{106}Ru plaques. *Ocul. Oncol. Pathol.* **5**, 276–283, 2019

6. F.J. Zaragoza, M. Eichmann, D. Flühs, B. Timmermann, L. Brualla. Monte Carlo computation of dose volume histograms in the structures at risk of an eye irradiated with heterogeneous ^{106}Ru plaques. *Ocul. Oncol. Pathol.* **6**, 353–359, 2020

5. **Student**: Nico Verbeek
Thesis title: Monte Carlo simulations and experiments of therapeutic proton beams in matter
Mark: Magna cum laude
University: Universität Duisburg-Essen
Supervisor: Prof. Dr. Lorenzo Brualla
Date of the viva: July 7, 2022
Peer-reviewed articles published in relation to the thesis:

1. N. Verbeek, J. Wulff, C. Bäumer, S. Smyczek, B. Timmermann, L. Brualla. Single pencil beam benchmark of a module for Monte Carlo simulation of proton transport in the PENELOPE code. *Med. Phys.* **48**, 456–476, 2021

2. N. Verbeek, J. Wulff, M. Janson, C. Bäumer, S. Zahid„ B. Timmermann, L. Brualla. Experiments and Monte Carlo simulations on multiple Coulomb scattering of protons. *Med. Phys.* **48**, 3186–3199, 2021

ONGOING PhD THESES

6. **Student**: Tobias Schwertdfeger
Topic: Monte Carlo methods applied to triage optimization in mass casualty events
University: Universität Duisburg-Essen, Germany
Supervisor: Prof. Dr. Lorenzo Brualla
Expected date of submission: July 2026

7. **Student**: Fabian Vollmer
Topic: Fuzzy and stochastic Turing machines applied to triage optimization in mass casualty events
University: Universität Duisburg-Essen, Germany
Supervisor: Prof. Dr. Lorenzo Brualla
Expected date of submission: December 2027

8. **Student**: Marta Sánchez-Bret
Topic: Development of a living-lab addressed to children with autism
University: Universität Duisburg-Essen, Germany
Supervisor: Prof. Dr. Lorenzo Brualla

Expected date of submission: July 2028

2.4.2 Supervision of master's degree students

FINALIZED MASTER'S THESES

Year	Number of master's degree students	University
2021	1	Heinrich-Heine Universität Düsseldorf
2022	1	Heinrich-Heine Universität Düsseldorf