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Section A. PERSONAL DATA

Name and Surname	Nuria Fuster Martínez		
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Researcher's identification number	Researcher ID		
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* Obligatorio

A.1. Current professional situation

Institution	Consejo Superior de Investigaciones Científicas (CSIC)		
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Professional category	Postdoc	Start date	2021
Keywords			

A.2. Academic education (Degrees, institutions, dates)

Bachelor/Master/PhD	University	Year
Programa Oficial de Doctorado en Ciencias Físicas	Universitat de València	2017
Master degree in Advance Physics	Universitat de València	2012
Technology of Particle accelerators (80 hours of courses)	Joint Universities Accelerator School (JUAS)	2012
Science and Physics of Particle accelerators (80 hours of courses)	Joint Universities Accelerator School (JUAS)	2012
Degree in Physics	Universitat de València	2011

A.3. General quality indicators of scientific production

-My PhD thesis, a stage where my research was fundamentally guided, but I had the chance to work at international laboratories in worldwide collaborations. As a highlight I may mention the design and successful commissioning of a fundamental collimation system for ATF2 in Japan, where we broke in 2016 a record on the smallest beam size ever achieved of 41 nm, a key milestone for the production of the International Linear Collider project (cost 7B\$).

- A 3 years fellowship at CERN, where I played a major role in the operation of the LHC collimation system (achieving a new LHC record luminosity in 2018 of 66 fb⁻¹). I also started to have self-managed responsibilities in the development of new tools and methods for ion beam runs to boost the LHC performance. The simulation code and aperture measurement method I worked on will be used in the future LHC runs from 2021.

-Since May 2020 I am focusing my activities on accelerator applications in medicine, a field with many open opportunities and innovation. In 2020 I was Co-PI of a project carried out by IFIC and Instituto Tecnológico del Plástico, with the main goal of developing intelligent nanoparticles for ion therapy optimization. I worked as a coordinator of the nanoparticle characterization activities and on the development of nanoparticle-ion beam interaction simulations.

Though these achievements can be considered of great success, this is not reflected on the most popular scientific quality indicators. Most worldwide known scientists in the field of particle accelerators have a rather “small” record compared to researchers in other fields. For instance in Nuclear and Theoretical Physics, the average top 10 researchers h-index is 96 and 127, respectively, and for accelerator physics is 18, up to a factor 7 difference. There are multiple reasons that explain this:

- There is no philosophy of publishing because most of the research is made in few worldwide laboratories hosting the accelerators, which are not academic institutes and the priority is not publishing but keeping the accelerators operational and improve them. Besides, historically, most publications are done as internal reports or in conference proceedings, which are not taken in consideration in some databases such as SCOPUS.
- There are no high impact journals in the field, which reinforces the practice of not publishing (only two specific journals: Physical Review Accelerator and Beams and Nuclear Instrumentation Method A, in quartiles 3 and 4, respectively).
- Accelerators are scarce and complex and the scientific community behind them is small, which is reflected on the cites number reach.

Taking into account this, I have 48 international publications (journal papers, proceedings and internal notes) and an h-index of 6 with 292 citations (INSPIRES). From all publications, 60% are without my PhD director as a co-author demonstrating my self-initiative. I have presented my work in 17 international workshops and conferences with a total of 9 oral contributions, being 2 plenaries (9th Evian LHC Operation Workshop and a HL-LHC collimation review in 2019). I have also participated in different outreach events, for example: in the 2016 Linear Collider Workshop event for school students and in the article "Españolas en la catedral de la física europea" published in the Sinc online magazine in 2020. I am also in the lecturers team of the Joint Universities Accelerator School, the reference accelerator school in Europe.

Section B. SUMMARY OF THE CURRICULUM

I was born in Valencia, Spain, on September 25, 1988. I am Doctor in Physics specialized in accelerator applied physics and technology with 8 years of research experience. My expertise areas are collimation, beam dynamic simulations of charged particles, particle-matter interactions physics, beam instrumentation and experimental test beams. I gained my experience and applied my work in different accelerators: the Free Electron Laser in Hamburg (FLASH) in Germany, the Large Hadron Collider (LHC) in Switzerland, the Facility for Advanced Accelerator Experimental Tests in the USA, as well as in the Advanced Test Facility (ATF2) in Japan. I am in the lecturers team of the most relevant accelerator school in Europe (JUAS, France), as tutor for the MAD-X accelerator design (2016/2018-2021) and Transverse beam dynamics (2021) courses.

I completed the Degree in Physics in 2011, the Master Degree in Advanced Physics in 2012 and the international Physics PhD in 2017 at the University of Valencia. In 2010, I was granted with a one-year Spanish University Collaboration Scholarship to perform theoretical studies of the Multipactor effect in the University of Valencia, and with the Deutsches Elektronen-synchrotron (DESY) summer student fellowship to work within the FLASH group in Germany. In 2011, I was awarded with the European Organization for Nuclear Research (CERN) summer student fellowship to work in the beams and accelerator physics department.

From 2012 to beginning of 2014 I had a contract to perform my PhD within the Accelerators group at Instituto de Física Corpuscular (IFIC) and in 2014 I was awarded with the PhD fellowship VALi+d from la Generalitat Valenciana. During the PhD I have **designed, installed and made successfully operational a collimation system** for the ATF2 accelerator in Japan (publications Ref[4]). In that collaboration **we broke in 2016 a record on the smallest beam size ever achieved** of 41 nm. I attended 3 accelerator schools and I performed several stays at LAL (France) and ATF2 (Japan).

In 2017, I was awarded with a 3 years senior fellowship at CERN in the beam physics and accelerators department to work in the LHC, the world's largest accelerator for particle physics experiments. **In 2017 and 2018 LHC runs**, I played a major role in the operation of the collimation system and worked on the performance optimization of the LHC (achieving in 2018 a **new luminosity record** of 66 fb⁻¹) and the High-Luminosity LHC project. During this period, I worked on the development of a new simulation tool, combining the accelerator software SixTrack and FLUKA for heavy-ion collimation (publications Ref[2]), which I used to

optimize the collimation system in 2018 for a successful ion run. In addition, I coordinated the development of a new beam-based method to measure the smallest aperture in the accelerator based on ac dipole magnets and collimators (Ref[12], a journal publication is being prepared). During the last months of fellowship I was part of the team coordinating the installation of new collimators for the LHC Run 3 (2021).

In mid 2020 I returned to Spain and I am focusing my research activities in accelerator applications in medicine, focusing in high-gradient accelerators and novel radio-therapy techniques. In 2020 I was Co-PI of a project carried out between IFIC and Instituto Tecnológico del Plástico, investigating the combined use of accelerated beams and nanoparticles for hadrontherapy optimization.

Section C. MOST RELEVANT MERITS (ordered by typology)

C.1. Publications

AC: Autor de correspondencia; (n° x / n° y): posición firma solicitante / total autores

- 1 Scientific paper.** D. Gonzalez-Iglesias; D. Esperante; B. Gimeno; et al; ;. (6/9). 2021. Analytical RF Pulse Heating Analysis for High Gradient Accelerating Structures IEEE Transactions on Nuclear Science.
- 2 Scientific paper.** N. Fuster-Martínez (AC); R. Bruce; F. Cerutti; et al;. (1/10). 2020. Simulations of heavy-ion halo collimation at the CERN Large Hadron Collider: Benchmark with measurements and cleaning performance evaluation Physical Review Accelerators and Beams.
- 3 Scientific paper.** A. Gorzawski; A. Abramov; R. Bruce; N. Fuster-Martínez; M. Krasny; J. Molson; S. Redaelli; M. Schaumann. (4/8). 2020. Collimation of partially stripped ions in the CERN Large Hadron Collider Physical Review Accelerators and Beams.
- 4 Scientific paper.** N. Fuster-Martínez (AC); P. Bambade; A. Faus-Golfe; et al;. (1/10). 2019. Beam halo collimation studies and measurements at the Accelerator Test Facility ATF2 Nucl. Instrum. Meth. A (NIMA). A917, pp.31-42.
- 5 Scientific paper.** A. Abramov; R. Bruce; M. Crouch; N. Fuster-Martínez; A. Mereghetti; Molson, James; Nevay, Laurence; Redaelli, Stefano. (4/8). 2019. Collimation of heavy-ion beams in the HE-LHC Proceedings, 10th International Particle Accelerator Conference (IPAC2019): Melbourne, Australia, May 19-24, 2019. pp.MOPRB059-MOPRB059.
- 6 Scientific paper.** A. Faus-Golfe; J. Navarro; N. Fuster Martinez; J. Resta Lopez; J. Giner Navarro. (3/6). 2016. Emittance reconstruction from measured beam sizes in ATF2 and perspectives for ILC Nucl. Instrum. Meth. A (NIMA). A819, pp.122-138.
- 7 Scientific paper.** S. Liu; et al. (5/12). 2016. In vacuum diamond sensor scanner for beam halo measurements in the beam line at the KEK Accelerator Test Facility Nucl. Instrum. Meth. A (NIMA). A832, pp.231-242.
- 8 Scientific paper.** H. L. Andrews; et al. (9/16). 2014. Reconstruction of the time profile of 20.35 GeV, subpicosecond long electron bunches by means of coherent Smith-Purcell radiation Physical Review Accelerators and Beams. 17-5, pp.052802-052802.
- 9 Scientific book or monograph.** CLIC and CLICdp collaborations. (/517). 2016. Updated Baseline for a staged Compact Linear Collider CERN Yellow Reports. 4.
- 10 Scientific-technical report.** R. Bruce; et al. (5/12). 2020. HL-LHC operational scenarios for Pb-Pb and p-Pb operation CERN-ACC-2020-0011. CERN.
- 11 Scientific-technical report.** S. Fartoukh; et al. (8/25). 2019. First High-Intensity Beam Tests with Telescopic Flat Optics at the LHC CERN-ACC-2019-0052.CERN.
- 12 Scientific-technical report.** S. Fartoukh; et al. (9/31). 2018. Round telescopic optics with large telescopic index CERN-ACC-2018-0032. CERN.
- 13 Scientific-technical report.** N. Fuster-Martínez (AC); et al. (1/8). 2018. Aperture measurements with AC dipole CERN-ACC-NOTE-2018-00008. CERN.
- 14 Scientific-technical report.** N. Fuster-Martínez (AC); S. Redaelli; R. Bruce. (1/3). 2017. LHC beta*-reach MD: aperture measurements at small beta* CERN-ACC-NOTE-2017-0064.

- 15 Scientific-technical report.** N. Fuster-Martínez (AC); J. Snuverink; A. Latina; A. Faus-Golfe. (1/4). 2016. Geometrical wakefield study of a rectangular collimator for ATF2 ATF2-01-16 report and CLIC note 1069. KEK and CERN.
- 16 Scientific-technical report.** N. Fuster-Martínez (AC); T. Terenuma; T. Tauchi; et al;. (1/9). 2014. Beam halo measurements with wire scanners at ATF2 ATF2-14-01. KEK.
- 17 Scientific-technical report.** Resta-Lopez, J.; et al. (4/12). 2014. Proposal for Single-Bunch Collimator Wakefield Measurements at SLAC ESTB arXiv:1212.6023.
- 18 Scientific-technical report.** N. Delarue; et al. (15/16). 2013. Longitudinal Profile Monitor using Smith-Purcell-Radiation: Recent Results from the E-203 Collaboration SLAC-PUB-15744. SLAC.
- 19 Workshop Proceedings.** A. Mereghetti; et al. (3/14). 2019. Beam losses, lifetime and collimator hierarchy 8th Evian Workshop on LHC beam operation. CERN-ACC-2019-012.
- 20 Workshop Proceedings.** N. Fuster-Martínez (AC); et al. (1/29). 2019. Run 2 collimation overview 9th Evian LHC Operation Workshop. CERN-ACC-2019-059. CERN.

C.2. Participation in R&D and Innovation projects

- 1** High Luminosity Large Hadron Collider (HL-LHC) L. Rossi. (CERN). 05/2017-04/2020.
- 2** FPA2015-65652-C4-3-R. Contribución a la operación de ATLAS y análisis de datos. Investigación y desarrollo (I+D) para los Futuros Aceleradores y estudios de física A. Faus-Golfe. (IFIC). 01/2016-12/2018.
- 3** e-JADE, H2020-MSCA-RISE-2014. Europe-Japan Accelerator Development S. Stapnes. (DESY, CERN, CNRS, CSIC, UoOX, RHUL, CEA). 01/2015-12/2018. 1.500.000 €.
- 4** i-LINK2013: I-LINK0704. Halo Collimation and Collimation Wakefields studies in ATF2 A. Faus-Golfe. (IFIC-LAL-KEK). 01/2014-12/2015. 29.800 €.
- 5** Estudio del Efecto Multipactor, Ministerio de Educación B. Gimeno. (Universitat de València). 01/09/2011-06/09/2011. 2.700 €.
- 6** FPA2010-21456-C02-00. Nuevas tecnologías en Aceleradores (IFIC-CIEMAT). From 01/2010. 312.900 €.

C.3. Participation in R&D and Innovation contracts

Uso combinado de nanopartículas y aceleradores para optimización de la hadronterapia D. Esperante N.Fuster-Martínez. (IFIC-AIMPLAS). 09/11/2020-09/01/2021. 4.840 €.

C.4. Patents