

CURRICULUM VITAE

Luigi Giuseppe Celona

PERSONAL SUMMARY

L.G. Celona received the degree in Electronic Engineering at the University of Catania, in 1995 and he joined the Istituto Nazionale di Fisica Nucleare in 1996, at the Laboratori Nazionali del Sud (INFN-LNS), becoming Technological Engineer (“Tecnologo”) in 1998, Principal Technological Engineer (Primo Tecnologo) in 2006 and Technological Research Director in 2019.

His main field of activity covers all the aspects of the production of singly and highly charged beams together with their acceleration to increase the performances of Particles Accelerators for Nuclear and Applied Physics.

Experienced in all the design stages of an ion source: from mechanical design and manufacturing through the installation and final commissioning, he is also active in research and development, proposing different innovative concepts concerning the role of microwaves in the development of ECR and microwave ion sources. He is actively working on the construction and development of many different ion sources, carrying out various experiments at the major facilities worldwide (GSI, CEA, MSU, LPSC, JYFL, LBNL, IMP, etc), interacting also on several technical issues with their relative experts and sometime getting involved in finding a solution.

Actually, he is the Head of the INFN-LNS Accelerator Division, a member of the Conseil Scientifique et Technique du Département (CSTD) des Accélérateurs, de Cryogénie et de Magnétisme (DACM) du CEA and he recently finished his mandate of the INFN Machine Advisory Committee with the aim to evaluate the existing and the new proposals, to develop innovative technologies in the accelerator physics, to address the participation to European projects devoted to the realization of new big research infrastructure and the relative impact on financial and human resources needed. He was member of the steering committee of the SPES project and, in the European framework, he was a referee committee member of ARES and EMILIE projects to coordinate the R&D activities on ECR ion sources of the major European physics labs.

He was the technical and scientific responsible of a joint-venture between INFN-LNS and some SMEs to design, realize and test a new hybrid ion source for Hadrontherapy named AISHa; two ion sources have been manufactured and successfully commissioned, others are under discussion. He worked also for the actual CNAO ECR sources with technical innovations to reach the requests set by the facility.

He was the Leader of the design, manufacturing and commissioning of the high intensity proton sources along with the low energy beam transfer line for the European Spallation Source (ESS). A deep effort has been needed to cope the stringent requests in terms of high beam reliability, low emittance, fast beam pulse rise/fall times and the wide current tuning range. The outstanding commissioning results fully comply the requirements given. The first source has been successfully installed in its final position at ESS site at the beginning of 2018 as a first part of ESS linac.

He also designed and built other types of ion and plasma sources for high efficiency ionization of the reaction products originating from an ISOL target and for intense monocharged production of light ions.

During the period 2004-2007 he focused his efforts on the EXCYT radioactive beam facility, coordinating the installation, the commissioning and permitting to deliver the ^8Li beam for the first experiments. He also worked on the development of the K-800 Superconducting Cyclotron bunching system contributing to the optimization of the cyclotron in the years 1995-1998 and to the axial injection beamline.

During the years, in the framework of the INFN 5th National Commission he proposed several experiments acting also as National or Local Responsible, actually he is the national responsible of the IONS experiment.

The great continuity and quality of the results obtained on several fronts at the same time is evidenced by the number of oral and invited talks presented to international conferences.

He is a IAC member of the HIAT and ECRIS conferences, several times served as SPC member of ICIS conference and he was the chair of ECRIS 2018 and Co- Chair of ICIS 2011.

Possessing a good team spirit, he developed a team leadership style based on result oriented and effective approach.

Research Topics

Microwave-plasma interaction- Plasma Based Ion sources- Electron Cyclotron Resonance Ion Sources- Plasma and ion beams diagnostics methods- Multidisciplinary applications of plasmas- RF based plasma diagnostics methods, plasma immersed probes (Langmuir Probe) and plasma-emitted radiation diagnostics (OES, X ray detectors, interferometers)- Simulation and modelling of plasma dynamics (heating, confinement)- Production of intense beams of monocharged ions- Beam transport and acceleration.

Professional record

- March 2019 – today **Permanent staff at INFN Laboratori Nazionali del Sud, Catania.**
I level MSc. Technological Research Director
“Dirigente Tecnologo” winner of competitive examination 19816/2018.
- Jan. 2006 – Feb. 2019 **Permanent staff at INFN Laboratori Nazionali del Sud, Catania.**
II level Principal MSc. Technological Engineer
“Primo Tecnologo” winner of competitive examination 10668/2004.
- Feb 2001-Dec. 2005 **Permanent staff at INFN Laboratori Nazionali del Sud, Catania.**
III level MSc. Technological Engineer
“Tecnologo” winner of competitive examination 7708/99.
- Oct. 1998-Oct. 2001 **Temporary staff at INFN Laboratori Nazionali del Sud, Catania.**
III level MSc. Technological Engineer
- Oct. 1996-Oct. 1998 **Fellowship at INFN Laboratori Nazionali del Sud, Catania.**
Project: “ Study of the coupling between microwave generators and ion sources”.
- Oct. 1995-Feb. 1996 **ANTECH S.p.A. - Catania**
Professional agreement for the study, realization and installation of the transmission filters and waveguide branching to be installed at satellite TV AB Television (France).

Education

- April 1995 **University of Catania, Italy**
Master degree in Electronic Engineering. (5 yrs.)
 Design and implementation of a Low Energy buncher for the K-800 superconducting cyclotron (*carried out in the INFN-LNS Accelerator Division*).

Qualifications

- March 2018- March 2024 **National Scientific Qualification to function as Associate Professor in Italian Universities** (Italian Ministry of Education, universities and research – MIUR) - Sector 09/F1– “Campi elettromagnetici”
- June 1995 Officially recognized by the Italian government as **Professional Engineer** after successfully completing the State examination.

- Spoken languages** *Italian:* Mother Tongue *English:* Fluent writing & speaking
 French: Good writing & speaking, *German:* Elementary notions

Coordination and Management

- April 2021-today* **Head of INFN-LNS Accelerator Division.**
- January 2021-today* **National responsible of the IONS experiment within the 5th INFN commission (Technological, interdisciplinary and accelerators research).**
The IONS experiment proposes a research and development program aimed at improving the performance of positive ion sources for accelerators, through knowledge and control of plasma parameters and the relative correlation with beam parameters. (Budget: ~300 k€)
- January 2020- today* **Local responsible of the IONS experiment within the 3rd INFN commission (Nuclear Physics).**
The PANDORA experiment aims to use a magnetic trap capable of confining plasmas at high temperature (up to 10^8 K) and density of the order of 10^{13} cm⁻³, containing multi-ionized radioactive isotopes in order to study their β decay in astrophysical conditions (for example, for the elements involved in the "s" process of stellar nucleosynthesis). The final goal is to measure the variation of the average lifetimes of isotopes subject to β decay, theoretically predicted and experimentally observed only in a small number of isotopes under conditions of maximum ionization. (Budget 3 M€)
- June 2018-today* **Member of the Conseil Scientifique et Technique du Département (CSTD) des Accélérateurs, de Cryogénie et de Magnétisme (DACM) du CEA.**
- June 2017-April 2020* **Member of the INFN Machine Advisory committee.**
Evaluation of the existing and new proposals to develop innovative technologies in the accelerator physics; address the participation to European projects devoted to the realization of new big research infrastructure and the relative impact on financial and human resources needed.
- Jan. 2013-today* **AISHa project team leader.**
Design, construction and commissioning of a high performance ECR ion source for Hadrontherapy.
Supported by the Regional Government of Sicily and funded within the framework of the Sicilian Government program named PO FESR 2007-2013 (Budget: ~5 M€).
- Jan. 2011-Oct.2021* **Leader of the Work Unit regarding the high intensity ESS proton sources and its LEBT.**
Design, construction and commissioning of two high intensity proton sources for the European Spallation Source along with their Low Energy Beam Transfer Line.
Supported by the MIUR (Budget: ~5.1 M€).
- 2016- 2019* **DEMETRA experiment**
Study and development of high gradient dielectric and metallic RF accelerating structures. Supported by the 5th National Commission of INFN (Budget: 303 k€).
- 2013- 2016* **Leader of the Work Package 8 inside the RDH experiment**
Design and development of new components of accelerators for Hadrontherapy.
Supported by the 5th National Commission of INFN (Budget: 83 k€).
- 2012-2013* **National responsible of the UTOPIA experiment**

Electromagnetic wave interaction with plasma and generation of plasma waves in compact size machines. (merged into WP8 of RDH a year after its opening). Supported by the 5th National Commission of INFN (Budget: 66 k€).

- 2012-2014 **Referee committee member of the ARES European collaboration**
Coordination of the R&D activities on ECR ion sources (Task1: Plasma heating, Wave-plasma interaction) of the major European physics labs (GSI, INFN, KVI, JYFL, ATOMKI, IFIN-HH, IKF) participating to the European programme. Final meeting: <http://indico.gsi.de/event/3261/>
- 2012-2016 **Referee committee member of the EMILIE European collaboration**
Coordination of the R&D activities on ECR-based charge breeders of the major European physics labs (GANIL, INFN, LPSC, HIL, JYFL, CERN) to enhance the production of short lived isotopes.
- 2010-2013 **Member of the SPES referee committee**
Address the technical and financial issues related to the construction of the SPES radioactive nuclear beam facility at INFN-LNL.
- 2009-2011 **Responsible for INFN-LNS of the HELIOS experiment**
Generation of hot electron layers in high density plasmas of ECR Ion Sources under different values of power and frequencies of the pumping electromagnetic wave. Supported by the 5th National Commission of INFN (Budget: 210 k€).
- 2005-2008 **Responsible for INFN-LNS of the INES experiment**
Innovative methods of electromagnetic waves coupling to plasmas of ECR Ion Sources Supported by the 5th National Commission of INFN (Budget: 160k€).
- 2004-2007 **Technological and scientific coordination of the EXCYT facility**
Coordination of the final assembling, the commissioning and the first experiments of the EXCYT facility at INFN-LNS.
- 2002-2008 **Representative of the LNS Technological Research personnel for two terms**

Committee Memberships

- 2022 **Member of the International Advisory Committee of the 15th International Conference on Heavy Ion Accelerator Technology**
<https://indico.gsi.de/event/12135/page/1171-international-advisory-committee>
- 2021 **Member of the Scientific Advisory Committee of the International Conference on Ion Sources, September 2021**
<https://icis2021.triumf.ca/committees.html>
- 2020 **Member of the International Advisory Committee of the 24th International Workshop on ECR Ion Sources, September 2020**
<https://indico.frib.msu.edu/event/9/page/238-committees>
- 2019 **Member of the Scientific Advisory Committee of the 18th International Conference on Ion Sources, Lanzhou, September 2019**
<https://icis2019.impcas.ac.cn/event/1/>
- 2016 **Chairman of the 23rd International Workshop on ECR Ion Sources, Catania (Italy), September 2018** <http://ecris18.lns.infn.it/>
- 2011 **Co-chairman and SPC Member of the 14th International Conference on Ion Sources, Giardini Naxos (Italy), September 12th – 16th 2011**

Track record of the Technological Activities

Overview

L.G. Celona received the degree in Electronic Engineering at the University of Catania, in 1995 and he joined the Istituto Nazionale di Fisica Nucleare in 1996, at the Laboratori Nazionali del Sud (INFN-LNS), becoming Technological Engineer (“Tecnologo”) in 1998, Principal Technological Engineer (Primo Tecnologo) in 2006 and Technological Research Director in 2019.

Since April 2021 I was appointed with a 3-year mandate as Head of Accelerator Division in a critical time window where the LNS personal turn-over is overlapped with the completion of the POTLNS program whose goal is to refurbish and upgrade current LNS infrastructure by increasing the beam intensity at the exit of the cyclotron of about 2 orders of magnitude. This will also permit to increase the production of in-flight radioactive beams. The strengthening of the facility for the radioactive fragmentation beams production consists in the installation of a new fragment separator, called FRAISE, able to operate with a high intensity primary beam in an area where it is possible to install a shielding bunker (the new line will also be able to transport stable beams with high efficiency). In this framework the upgrading of the experimental apparatus for the NUMEN project is also planned.

Inside this scenario and to face such future challenges I pursued several actions to lead the entire division through this critical time: speaking with the different groups of the division with the main focus on the status of the high priority activities to be completed for the POTLNS programme, defining the work planning, the related budget and the resource allocations with the preparation of new organization chart, actually under examination at INFN board.

The technological and management activity over the years has been focused on the **design, construction and commissioning** of more **reliable and effective** Electron Cyclotron Resonance and Microwave Discharge Ion Sources to **increase** the Particles Accelerator performances.

High-performance plasma-based ion sources play a role of expanding importance, for feeding particle accelerators devoted to Nuclear Physics and Applied Research.

The driving idea of the entire activity has been to **refine the knowledge** on the fundamental **plasma physics** underlying the ion beam generation mechanism and consequently **improve all the related technological aspects**, this approach allowed significative performance steps forward in terms of overall performances.

Such goal has been achieved over the years working around all the components of an ion source: from the microwave injection to the beam formation, transport and its relative diagnostics.

Outstanding results have been obtained with this methodical approach especially pursuing the **studies about an optimal coupling between the electromagnetic waves and the generated plasmas**. The experiments start from the strong belief that an electromagnetic mode structure is enforced in the source plasma chamber even in presence of plasma. This approach allowed to **discover several interplays between the microscopical plasma parameters** – especially the electron energy distribution function and the structural

distribution of the plasma density – **and the beam quality**, namely the current, the average charge state, and the emittance.

The quality of the obtained results is testified by **several oral and invited talks** given in international conferences on such subject and **the acquired knowledge is now guiding the optimization of the existing sources** as well as the **design and construction of the future generation ECRIS**.

The innovative tests carried out over the years have constantly backed the activities of INFN-LNS ion sources group, which plays also a **worldwide leading role** in the **design, construction and characterization of ion injectors** for particles accelerators as demonstrated by the leadership's role covered in the ENSAR-ARES international collaboration (in the frame of the FP7/2007–2013) and in the European Spallation Source (ESS) project.

He is the Head of the INFN-LNS Accelerator Division and he is a member of the Conseil Scientifique et Technique du Département (CSTD) des Accélérateurs, de Cryogénie et de Magnétisme (DACM) du CEA and he just finished its mandate of the INFN Machine Advisory Committee as ion source expert with the aim to **evaluate the existing and the new proposals to develop innovative technologies in the accelerator physics**, to address the participation to European projects devoted to the realization of new big research infrastructure and the relative impact on financial and human resources needed. He was member of the steering committee of the SPES project and, in the European framework, he was a referee committee member of ARES and EMILIE projects to coordinate the R&D activities on ECR ion sources of the major European physics labs.

The technological research activity carried out and the experience gained has been recognized with the **leadership of the design, production and commissioning** of the high intense proton source and of the relative low energy transfer line (up to the RFQ) **for the ESS project**. A long phase of study and testing was necessary to define the design of the source because of the high-profile requirements in terms of reliability, current and emittance of the proton beam and times of rising and falling of the beam pulse.

The source resumes the experience gained in more than 20 years of work in this field and **represents the state of art of this kind of sources worldwide**: the **outstanding results of the commissioning** carried out at the LNS, followed by the **successful installation** and commissioning in the ESS accelerator tunnel have been an important milestone in the construction of this big infrastructure and it was reported in all the related accelerator conferences.

An important contribution to the development of **ECR sources for the CNAO hadrontherapy center has been given in the last decade**, in particular, the innovative solutions suggested allowed to satisfy the **requirements of reliability and intensity** of the beam produced which are **fundamental for such kind of application**. The need, in this specific field, to have a more performing source led to the definition of a new innovative and high performance source named AISHa designed to operate in a hospital environment with all the constraints related.

The realization of this source was financed in the line of intervention 4.1.1.1 of the **POR FESR Sicilia 2007-2013**, supporting the activities of experimental development, of industrial

research and, partially also of fundamental research with high degree of integration between SMEs and Research Institutions.

Currently he is the **Technical-Scientific Responsible of the Temporary Association of Companies** between INFN and the 3 participating SMEs. To date two sources have been built: one within the aforementioned POR and a second one funded under the IRPT project. The achieved results have raised up a lot of interest by the scientific community because it represents a **turnkey solution to get a compact and performant source that are of interest also in nuclear physics labs.**

Furthermore, the activities have given rise to several completely innovative sources in the framework of several projects, such as: **MIDAS2, TRIPS, VIS**, in which he independently carried out the conceptual design, defining all the characteristic parameters and coordinating the subsequent operative steps: the design of the equipment, the construction, the installation, tests and data acquisition, analysis and results synthesis.

In particular, the **MIDAS2** source was found to be very suitable for the **ionization of the reaction products produced from ISOL targets** and this solution was subsequently **adopted by several laboratories** (TRIUMF, GANIL, CERN).

The TRIPS project was **financed by the Ministry of University and Scientific Research, according to the law 95/95 for the technology transfer** and our work was carried out in collaboration with a consortium of companies (HITEC-SISTEC), demonstrating the possibility of an effective transfer of know-how.

The **VIS** source, born as an evolution of TRIPS, is extremely **versatile for high intensity production of light ions** (H, H₂, D, He, O). From 2013 to the end of 2014, it was operating at the BEST company (Vancouver, Canada) as intense H₂⁺ beam injector in a cyclotron used to study the central region of the accelerators to be implemented for the ISODAR and DAEΔALUS projects.

During the years 2004-2007 he also contributed significantly in the **realization of the EXCYT radioactive beam facility** focusing his daily efforts *coordinating* the installation, the commissioning of the entire facility and permitting to deliver the ⁸Li beam to the first experiments.

In this activity he continuously interacted with the staff of the technical division and the accelerator division of the LNS, supervising the work of the external companies employed, and organizing them in order to **allow the smooth running of the scientific program** of the LNS.

During the years, within the 5th National Commission as National or Local Responsible, he carried out a series of systematic study under several experiments with the aim to reveal the underlying physics, to optimize the related technologies and to analytically formalize the problem. In particular he is the national responsible of the **IONS** experiment, he was the **local responsible at LNS of INES and HELIOS** experiments and the **national responsible of the UTOPIA** experiment (merged into **WP8 of RDH** a year after its opening).

The experimental activity proceeded constantly side by side with the modelling through an analytical approach and with state of art electromagnetic simulators (HFSS, CST). Such tools, adequately supported by calculation resources permitted at the beginning to have the first

qualitative feedbacks on the wave-plasma interaction and on the ionization processes inside the plasma chamber, recently the *plasma "medium" has been successfully* taken into account implementing also the *self-consistency* procedures.

The results of this approach have shown a behavior of the source *strongly dependent also on small variations in frequency* (what he called "*frequency tuning effect*"), introducing to with the international community an innovative but disruptive and problematic concept.

These forecasts have been *confirmed by a series of measurements* made at GSI, where also investigated the output beam distribution has been investigated. In particular, by making frequency *variations of the order of MHz around the 14 GHz central frequency*, we found *variations in the emittance of the extracted beam*, accompanied also by a *variation in the intensity of the produced current*. Similar observations have been repeated in various laboratories confirming the reproducibility *of the phenomenon* described above and this has drawn the attention of the international community on the *importance of the coupling* between microwaves and ion sources.

The experimental validation of the *scaling laws up to 28 GHz* at INFN-LNS on the SERSE ion source represents a *breakthrough activity* that was carried out in the framework of a CERN-CEA-ISN-GSI-INFN collaboration, which aimed to produce medium-high and high-intensity ions for LHC. In the experiment he studied and realized the *coupling of the gyrotron of 28GHz-10 kW* with the SERSE source. It was the **first time** that a generator operating at such a **high frequency was coupled with an ECR source and the technological problems were brilliantly overcome** allowing to operate with a very low percentage of reflected power (in the order of a few%) obtaining current values and charge status never obtained previously. *Currently the existing 3rd generation sources such as VENUS (LBNL), SECRA (IMP), SC-ECRIS (Riken), use the same coupling scheme developed and tested for the first time on SERSE.*

The results achieved have been a **milestone** and permitted to **start the design of last generation ECRIS**, the idea was object of several invited on coupling issues.

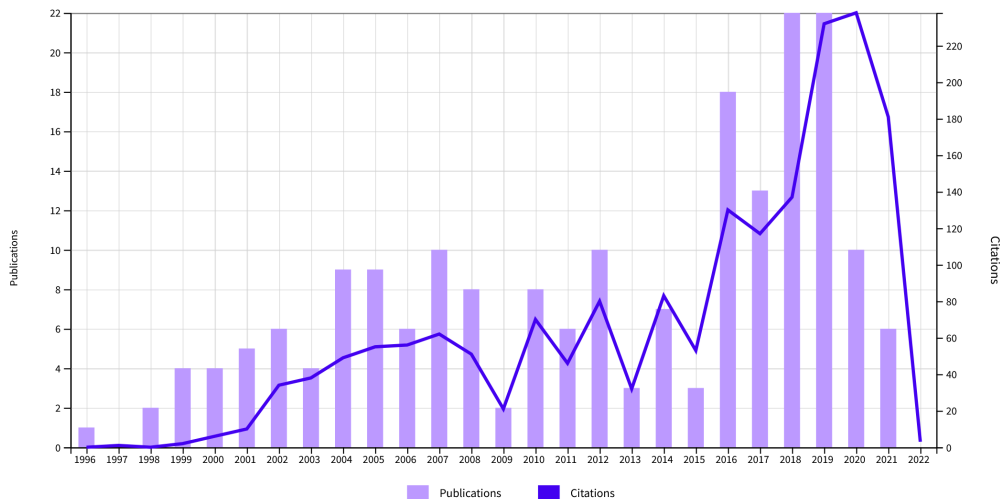
More recently, attention moved on the challenges for the coupling of 4th generation ECRIS (45 GHz). In particular, in the *optical approximation* other mechanism enter into the game and the microwave to plasma power deposition can be highly controlled.

Actually, the single-pass RF energy absorption efficiency at the Electron Cyclotron Resonance Layer is rather poor, and it is still difficult to drive energy deposition to specific parts of electron population. A "*microwave absorption optimization oriented*" design, based on the control of the electromagnetic radiation by a dedicated RF launcher, will permit a precise control of the **power deposition**. One of these launchers has been designed under my supervision and extensive test are planned for the first time in a compact ECR ion source.

The great continuity and quality of the results obtained on several fronts is testified by the number of oral and invited talks presented by him or co-workers in international conferences, by the large number of references to the works published and by several awards (Resmini and Geller prizes) given to doctorates working such topics under my supervision.

Publications

- **198 Papers indexed by ISI Web of Science (222 indexed by SCOPUS)**
- **H-index 20 according to ISI Web of Science (23 by SCOPUS, 30 by Scholar)**
- **Citations:1787 according to ISI Web of Science (1686 SCOPUS, 2779 by Scholar)**



10 papers

- 1) **L. Celona**, G. Ciavola, S. Gammino, *Study of microwave coupling in ECR ion sources and microwave ion sources*, Rev. Sci. Instr. 69(2), 1998, 1113-1115
- 2) S. Gammino, G. Ciavola, **L. Celona**, D. Hitz, A. Girard, G. Melin *Operation of the SERSE superconducting electron cyclotron resonance ion source at 28 GHz*, Rev. Sci. Instr., 72 (11), (2001), 4090-4097
- 3) **L. Celona**, G. Ciavola, S. Gammino, L. Andò, M. Presti, X. Guo, R. Gobin, R. Ferdinand, *Status of the TRIPS source and emittance measurements* Rev. Sci. Instr. 75 (5), (2004) 1423-1426
- 4) G. Cuttone, **L. Celona**, F. Chines, G. Cosentino, E. Messina, M. Re, D. Rizzo, V. Scuderi, F. Tudisco, A. Amato, L. Calabretta, G. De Luca, A. Pappalardo, S. Passarello, D. Rifuggiato, A. Rovelli, *EXCYT: the RIB Project at INFN-LNS*, Nucl. Instr. & Meth B 261, p. 1040, (2007)
- 5) **L. Celona**, G. Ciavola, F. Consoli, S. Gammino, F. Maimone, P. Spaedtke, K. Tinschert, R. Lang, J. Mader, J. Rosbach, S. Barbarino, R.S. Catalano, D. Mascali, *Observations of the frequency tuning effect in ECR ion sources*, Rev. Sci. Instr. 79 (2008) 023305
- 6) **L. Celona**, S. Gammino, F. Maimone, D. Mascali, G. Ciavola, *Observations of resonant modes formation in microwave generated magnetized plasmas*, Eur. Phys. Jour. D 61, 107-115 (2011)
- 7) S. Gammino, **L. Celona**, and D. Mascali, *Perspectives of Electron Cyclotron Resonance Ion Sources Beyond the Scaling Laws*, IEEE Trans.on Nuclear Science 63 (2) 1051-59 (2016)
- 8) **L. Celona**, L. Neri, S. Gammino, O. Leonardi, A. Miraglia, G. Torrisi, F. Chines, G. Calabrese, G. Manno, G. Castro, D. Mascali, M. Mazzaglia, A. Caruso, A. Spartà, A. Longhitano, *High intensity proton source and LEBT for the European Spallation Source*, 17th International Conference on Ion Sources, Ginevra, Svizzera, 15-20 October 2017, AIP Conference Proceedings
- 9) **L. Celona**, G. Castro, F. Chines, G. Costa, S. Gammino, O. Leonardi, S. Marletta, D. Mascali, A. Maugeri, L. Neri, F. M. Noto, S. Passarello, G. Pastore, A. Seminara, G. Torrisi, S. Vinciguerra, S. Di Martino, P. Nicotra, *Commissioning of the AISHa ion source at INFN-LNS*, 17th International Conference on Ion Sources, Ginevra, Svizzera 2017, AIP Conference Proceedings
- 10) L. Neri, **L. Celona**, *High stability microwave discharge ion sources*, Scientific Reports (2022) 12:3064 <https://doi.org/10.1038/s41598-022-06937-7> Nature portfolio

Giovanna Montagnoli

Curriculum Vitae

Education:

- 1982: graduated in Physics at the Padua University on July 22th with a score of 110/110.
- 1987: obtained on July 10th the PhD degree

Employment:

- 1983: one-year fellowship at the Technische Universitaet Munich, Germany
- 1986-1989: INFN contract at the Laboratori Nazionali di Legnaro
- 1989: permanent position as a researcher at the Department of Physics "G. Galilei" of the Padua University
- 1993: confirmed in the role of researcher.
- 2005: associate professor of physics at the Faculty of Agriculture, University of Padua
- 2009: confirmed in the role of associate Professor

Research activities:

The research activity has been mostly devoted to the experimental study of heavy-ion nuclear reactions at energies around the Coulomb barrier at Laboratori Nazionali di Legnaro INFN. Valuable contributions were brought to the development of particle detection techniques, in particular to the design and construction of the large acceptance magnetic spectrometer for heavy ions PRISMA. Experimental research has been carried out in the field of low-energy heavy ion reactions. In particular the dynamics of fusion reactions below the Coulomb barrier has been the object of several studies. In parallel two-body reactions have been investigated using Time of Flight spectrometers and more recently the magnetic spectrometer PRISMA. A research program was carried out using PRISMA coupled to arrays of gamma-ray detectors (Clara and Agata) with the aim of studying the structure of neutron-rich nuclei, populated by means of binary reactions such as multi-nucleon transfer and deep inelastic processes. Collaborations are in progress with researchers of the Univ. of Strasbourg, the RBI of Zagreb, the Inst. of Nucl. Phys. of Cracow and Argonne National Lab. .

Scientific responsibilities:

- 1993-1998: responsible for Padua of the "PISOLO" experiment, funded by INFN and devoted to studies of transfer reaction between heavy ions;
- 2000-2006 coordinator of the Experimental Nuclear Physics Group of the INFN- Padua Section.
- 2006-2009: responsible of the research project funded by the Univ. of Padua: "Nuclear structure and reaction dynamics near the Coulomb barrier with stable and radioactive ion beams" (budget ex 60%)
- 2009-2010: responsible of the "Progetto di Ateneo" on "Production of radioactive beams with the batch mode technique, using the SPES ciclotron of the LNL for the studies of nuclear structure and reaction dynamics between heavy ions";
- since 2014: participation in the "Progetto di Ateneo" on "Investigation of the heavy-ion fusion hindrance with the facility EXOTIC"
- since 2012: national responsible of the "PRISMA-FIDES" experiment, funded by INFN and devoted to studies of fusion and transfer reaction between heavy ions;

Teaching and Tutorial activities:

- holder of the Nuclear Physics and Advanced Laboratory courses for the master degree in Physics
- responsible for the Erasmus Mundus Program NUCPHYS for the University of Padova,
- responsible for the research activities of three fellows: Paolo Mason (2005-2009), Francesco Recchia (2010-2011) and Rosanna Depalo (dal 2015);
- supervisor of five PhD theses (Dr. Marco Calviani, Dr. Kaori Fujii, Dr. Tommaso Marchi, Dr. Giulia Colucci and Dr. Giorgia Mantovani)
- supervisor of several master and bachelor theses.

Padova 24 giugno 2022

Giovanna Montagnoli

CV breve

Esperienza lavorativa

1986 - oggi: Istituto Nazionale di Fisica Nucleare, sez. di Padova.

Occupazioni attuali:

- Rappresentante Nazionale del personale TA;
- Responsabile dei Servizi Tecnici Generali ed Elettronica della Sezione (10 addetti);
- RUP per gli acquisti di Elettronica e per gli acquisti per i STG;

Gennaio 1985 - Gennaio 1986 Servizio di Leva

Giugno 1982 - Settembre 1984: Marinello Tende

Istruzione e formazione

Ottobre 2009 - Dicembre 2012

Università degli studi di Padova – Laurea triennale con lode in SCGR. Tesi su “messa a punto di un sistema UV per il controllo dell’attività polifenol-ossidasi”

Settembre 1980 - Luglio 1984

ITIS “F. Severi”, Padova, diploma di maturità “Perito Capotecnico in Elettronica Industriale”

Lingue conosciute

- **Italiano** (madrelingua)
- **Inglese** buono
- **Francese** scolastico

Competenze tecniche:

Progettazione di sistemi e apparecchiature elettroniche sia analogiche che digitali;
Coordinamento di attività di R/D delle apparecchiature elettroniche sviluppate in Laboratorio di Elettronica;
Responsabile degli acquisti e RUP per le procedure del Laboratorio di Elettronica della Sezione, sia per acquisti di materiale di consumo (piccoli acquisti), sia per gare di sistemi complessi e di elevato importo;
Esperto tecnico, su incarico del Direttore, per gli acquisti della Sezione di materiale Elettronico;
Direttore per l’Esecuzione del Contratto per servizi alle conferenze EPS-HEP2017 e QUARK MATTER 218;
Presidente e componente di commissioni di gara per diverse Sezioni e Laboratori dell’INFN;
Componente di commissione in concorsi e selezioni per l’assunzione di personale all’INFN;
Co-titolare di due brevetti INFN.

Pubblicazioni:

Co-autore di oltre 40 pubblicazioni scientifiche su riviste internazionali con *referee*.

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