

Breve curriculum vitae di Giuseppe Russo

Professore Ordinario di Fisica Sperimentale
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Formazione

Giuseppe Russo è nato a Catania il 08 aprile del 1950. Laureato in Fisica, orientamento nucleare, nel 1972 con voti 110/110 e la lode all'Università di Catania. Dopo la laurea è stato titolare di una borsa di studio del Centro Siciliano di Fisica Nucleare e di Struttura della Materia dal luglio 1973 all'ottobre 1974. Ha conseguito le abilitazioni all'insegnamento nelle scuole secondarie superiori nelle classi di concorso: Fisica, Matematica e Fisica e Fisica, Impianti nucleari e Tecnologie Relative" con il massimo dei voti. E' stato vincitore di una cattedra di Fisica per la scuola secondaria. E' stato titolare di una borsa di studio della fondazione Von Humboldt presso il Max-Planck Institut di Heidelberg, di un Contratto Quadriennale presso la Facoltà di Scienze dell'Università di Catania. Ha conseguito, nel luglio 1977, il diploma della scuola di Specializzazione in Fisica, sezione Nucleare, con la votazione di 50/50 e lode. Professore incaricato dall'A.A. 1977/78 al 1981/82; Idoneo al Concorso nazionale per Professore Associato in Fisica Nucleare (SSD FIS/04); Professore Associato (SSD FIS/01) dall'A.A. 1982/83 all'A.A. 2002/2003; Idoneo al ruolo di professore universitario di prima fascia, nel 2002, per il settore scientifico disciplinare FIS/01 e Professore Ordinario (SSD FIS/01, settore concorsuale 02/A1 – Fisica sperimentali delle interazioni fondamentali) dall'A.A. 1983/84 presso il Dipartimento di Fisica e Astronomia dell'Università degli studi di Catania.

Incarichi Istituzionali

All'interno dell'Università degli studi di Catania è stato:

- Componente della Giunta di Direzione del Dipartimento di Fisica e Astronomia (1995-98)
- Componente della commissione spazi del DFA
- Componente della commissione organici
- Componente della commissione paritetica dipartimentale
- Componente del collegio dei docenti del dottorato in fisica
- Componente la commissione scientifica 02
- Componente del collegio di disciplina della sezione fascia degli Ordinari
- Presidente corso del corso di laurea L-30 dall'A.A. 2012/13 ad oggi
- Responsabile scientifico di progetti di ricerca MURST 60%
- Coordinatore dell'Indirizzo Fisico -Informatico- Matematico della Scuola Interuniversitaria Siciliana di Specializzazione per l'Insegnamento Secondario (SISSIS), sezione di Catania dal Marzo 2001 fino al 30 aprile dell'A.A. 2006/07 e dal 01 novembre dell'A.A. 2006/07 fino alla chiusura delle attività della SISSIS
- Referente TFA per la classe A049- Matematica e Fisica
- Rappresentante del Dipartimento di Fisica e Astronomia presso il Consiglio di Presidenza della facoltà di Scienze Mat., Fis. e Nat.li dell'Università di Catania

- Responsabile del laboratorio Microtrone

E' stato inoltre:

- Componente del Comitato Regionale Ricerche Nucleari e di Struttura della Materia (C.R.R.N.S.M.) per il triennio 1986/89
- Rappresentante dei ricercatori nel consiglio della sezione di Catania dell'INFN
- Responsabile scientifico locale e nazionale di esperimenti presso la sezione INFN di Catania
- Componente di commissione in svariati concorsi e valutazioni comparative per borse e assegni di studio, per ruoli di Ricercatore, Professori Associato e Ordinario nonché componente di alcune commissioni di Conferma dei professori associati per il settore FIS/01-Fisica Sperimentale presso Università italiane
- Coordinatore dei corsi integrativi nei licei ed istituti artistici dall' a.s. 2003/04 al 2006/07
- Componente della Commissione di concorso per il reclutamento dei Supervisor della SISIS
- Presidente della Commissione giudicatrice per l'ammissione alla Scuola Interuniversitaria Siciliana di Specializzazione per l'Insegnamento Secondario (SISIS), sezione di Catania, Indirizzo 2 Fisico -Informatico- Matematico negli A.A. 2001/02, 2002/03, 2003/04, 2004/05, 2005/06, 2006/07, 2007/08
- quale delegato del Rettore dell'Università di Catania, componente la Commissione Interuniversitaria per le modifiche da apportare al regolamento generale ed all'atto costitutivo della SISIS
- Presidente della Commissione Esaminatrice per l'esame di Stato finale della SISIS, sezione di Catania, Indirizzo 2 Fisico -Informatico- Matematico negli A.A. 2000/01, 2001/02, 2002/03, 2003/04, 2004/05, 2005/06 (sessioni ordinarie e straordinarie), 2007/08 e 2008/09 (sessioni ordinarie e straordinarie).
- Presidente di Commissione per la selezione di tutor coordinatori per il T.F.A. classe A049 - Matematica e Fisica

Attività didattica

Ha ricoperto numerosi insegnamenti presso le facoltà di Scienze, di Ingegneria, di Agraria e di Farmacia dell'Università di Catania:

- Fisica generale I
- Fisica Generale II
- Fisica Sperimentale II
- Esercitazioni di Fisica Sperimentale
- Fisica dei Reattori Nucleari
- Elettrodinamica Classica
- Fondamenti di Fisica Moderna
- Elettrodinamica Relativistica
- Oscillazioni e Onde
- Fondamenti di Fisica II
- Fondamenti di Fisica III
- Istituzioni di Matematica, Statistica e Fisica
- Struttura della Materia
- Radioattività
- Metodi Matematici applicati alla fisica
- Laboratorio di Fisica
- Fondamenti di Fisica sperimentale II
- Fisica I, II e III

- Fondamenti di Fisica Sperimentale I
- Fisica (SSD FIS/07)
- Matematica (SSD MAT/06)
- Temi di struttura della materia
- Esperienze didattiche di fisica II
- Fondamenti ed applicazioni alla fisica della statistica matematica

Ha ricoperto gli insegnamenti di Matematica, Fisica e Logica nei Corsi di Orientamento e preparazione agli esami di ammissione ai Corsi di Laurea a numero programmato, edizioni dal 2007 al 2017

Ha ricoperto, nell'A.A. 2015-16, un modulo dell'insegnamento di Complementi di Elettrodinamica Classica presso la Scuola Superiore dell'Università di Catania

È stato relatore di tesine e di numerose tesi di laurea e tutor di tesi di dottorato

È stato membro delle Commissioni giudicatrici del concorso di ammissione al Dottorato di Ricerca in Fisica X, XIV e X XVI ciclo e della Commissione giudicatrice per la valutazione dell'esame finale per il conseguimento del titolo di dottore di ricerca in Fisica, XV ciclo- Settore Fisica Nucleare.

Attività di ricerca

Le principali tematiche di ricerca hanno riguardato:

- Studio degli isomeri di forma con la tecnica della fissione in volo;
- Strutture intermedie in processi di fissione sottosoglia;
- Fotofissione sottosoglia con gamma di bresstrahlung;
- Fluidodinamica nucleare;
- Risonanze giganti su stati alto spin;
- Struttura dei nuclei ad alto spin;
- Proprietà dei nuclei caldi;
- Collisioni periferiche tra ioni pesanti;
- Spettroscopia gamma dei residui prodotti in collisioni periferiche;
- Emissioni di gamma di alta energia in reazioni dissipative;
- Produzione di protoni e pioni carichi ad energie intermedie;
- Studio di meccanismi di produzione di gamma di alta energia nelle collisioni nucleo-nucleo ad energie intermedie;
- Studio delle risonanze giganti di dipolo nei nuclei caldi;
- Studio della produzione di pioni neutri sotto soglia ad energie intermedie;
- Interferometria gamma di intensità nelle collisioni nucleo-nucleo ad energie intermedie;
- Produzione di pioni carichi e kaoni in collisioni p-nucleo;
- Fotoreazioni con fasci γ polarizzati, produzione di mesoni e studio delle risonanze barioniche;
- Misure di anisotropia della velocità della luce;
- Fondamenti di relatività speciale e teorie alternative;
- Misure dei fattori di forma elettrico e magnetico del nucleone;
- Misure di violazione della parità nella diffusione elettrone-quark e elettrone-deutone;
- Misura di elementi di matrice per il doppio decadimento beta senza neutrini mediante reazioni a doppio scambio di carica.

Elenco di alcune pubblicazioni tra le più recenti:

- 1) V. Kuznetsov ed altri tra cui G. Russo, “New narrow N(1685) and N(1726)? Remarks on the interpretation of the neutron anomaly as an interference phenomenon”, JETP Letters (2017), vol. 105, p. 1-6 ISSN: 0021-3640;
- 2) M. Defume ed altri tra cui G. Russo, “Rosenbluth separation of the π^0 Electroproduction cross section”, Phys. Rev. Lett.(2016), vol. 117, ISSN: 1092-0145;
- 3) V. Nedorezov ed altri tra cui G. Russo, “Disintegration of C-12 nuclei by 700-1500 Mev photon”, Nucl. Phys. A (2015), vol. 940, p. 264-278, ISSN: 0375-9474;
- 4) P. Levi Sandri ed altri tra cui G. Russo, “First measurements of the sigma beam asymmetry in eta photoproduction off the proton near threshold”, Eur. Phys. Jour. A (2015), vol. 51, ISSN: 1434-6001;
- 5) V. Vegna ed altri tra cui G. Russo, “Measurements of the Sigma beam asymmetry for the omega photoproduction off the proton and the neutron at GRAAL”, Phys. Rev. C (2015), vol. 91, ISSN: 0556-2813;
- 6) F. Schillaci ed altri tra cui G. Russo, “ Calibration and Energy resolution study of high dispersive power Thomson Parabola Spectrometer with monochromatic proton beams”, Jour. of Instr. (2014), vol. 9, p. 1-16, ISSN: 1748-0221;
- 7) D. Wang ed altri tra cui G. Russo, “Measurements of parity violation in electron-quark scattering”, Nature Physics (2014), vol. 506, p. 67-70, ISSN: 1745-2473;
- 8) D. Wang ed altri tra cui G. Russo, “Measurements of parity violation in electron-deuteron scattering in the nucleon resonance region”, Phys. Rev. Lett. (2013), vol. 111, ISSN: 0031-9007;
- 9) S. Abrahamyan ed altri tra cui G. Russo, “ Measurements of the Neutron Radius of Pb-208 through parity violation in electron scattering”, Phys. Rev. Lett. (2012), vol. 108, ISSN: 0031-9007;
- 10) Z. Ahmed ed altri tra cui G. Russo, “ New precision limit on the strange Vector form-factors of the proton”, Phys. Rev. Lett. (2012), vol. 108, 102001, ISSN: 0031-9007;

Autorizzo il trattamento dei miei dati personali ai sensi del Dlgs 196 del 30 giugno 2003

Curriculum Vitae of Prof. Francesco Cappuzzello

e-mail: cappuzzello@lns.infn.it

Address: Via S. Sofia 64, Catania, Italy

tel.: +39 095 542384

Present position

From 2006 onwards: Professor of experimental nuclear physics at the Department of Physics and Astronomy, University of Catania

Main academic and scientific degrees

2013 Invited researcher at the Universidade Federal Fluminense, Niteroi, Brasil

2005 Annual post-doc fellowship from the University of Catania

2001 Four years post-doc fellowship from INFN

1999 Ph.D. at University of Catania defending the Thesis cum Laude

1996 Master Degree in Physics at University of Catania with vote 110/110 cum Laude

Main research activities

- **Magnetic spectrometry:** I have contributed to the field of magnetic spectrometry. The main achievement is the design and construction of the MAGNEX large acceptance magnetic spectrometer, which has strongly characterized the first part of my career. The spectrometer is installed at the INFN-LNS laboratory and it is nowadays a unique device worldwide, conjugating large solid angle and large momentum acceptance with high energy, mass and angular resolution. As a consequence, it is attracting many research groups from abroad (almost half of the beam time delivered in recent years at the INFN laboratory and more than 50 researchers per year from abroad have proposed and performed experiments with MAGNEX). Part of this activity is presented in two review papers

The MAGNEX spectrometer: Results and perspectives F. Cappuzzello et al., *European Physical Journal A* (2016) 52: 167. DOI 10.1140/epja/i2016-16167-1

MAGNEX: an innovative large acceptance spectrometer for nuclear reaction studies F. Cappuzzello, D. Carbone, M. Cavallaro and A. Cunsolo, in: *Magnets: Types, Uses and Safety*, Nova Publisher Inc., New York, 2011, pp 1-63.

- **Transfer reactions:** I participated and organized, often acting as spokesperson, several experiments in various international laboratories studying nucleon and cluster transfer reactions. The major achievement has been the discovery of signatures of the long searched Giant Pairing Vibrations in atomic nuclei. Such finding has permitted to overcome a fundamental problem of symmetries in quantum-mechanics arising from the not observation for several decades of this collective mode

Signatures of the Giant Pairing Vibration in the ^{14}C and ^{15}C atomic nuclei, F. Cappuzzello et al., Nature Communications, Article number: 6743 (2015). DOI:10.1038/ncomms7743.

New structures in the continuum of ^{15}C populated by two-neutron transfer, F. Cappuzzello et al. Physics Letters B 711 (2012) 347-352. DOI:10.1016/j.physletb.2012.04.012

Elastic and inelastic scattering: I am spokesperson of an extensive collaboration with IFUSP of San Paolo and IFUFF of Niteroi (Brazil), which is focused on these issues. We have already shown that the phenomenon of nuclear rainbow is also present in collisions between heavy nuclei

Nuclear rainbow in the $^{16}\text{O}+^{27}\text{Al}$ system: The role of couplings at energies far above the barrier, D. Pereira et al., Physics Letters B 710 (2012) 426-429. DOI: 10.1016/j.physletb.2012.03.032).

- **Charge exchange reactions:** subject of the degree and Ph.D. theses. These studies have shown that the heavy-ion induced charge exchange cross sections are connected to the strength of the corresponding beta-decay, with major consequences in both nuclear physics and astrophysics. A large collaboration on these items has been established between our group and the RCNP laboratory of the Osaka University.

Analysis of the $^{11}\text{B} (^7\text{Li}, ^7\text{Be})^{11}\text{Be}$ reaction at 57 MeV in a microscopic approach F. Cappuzzello et al. Nuclear Physics A 739 (2004) 30-56. DOI: 10.1016/j.nuclphysa.2004.03.221).

- **Double Charge Exchange reactions:** I proposed the first pioneering experiments showing that the matrix elements of double beta decay can be extracted, under specific conditions, from cross sections of double charge exchange at zero degrees. This has triggered the NUMEN project of INFN, aiming at determining data-driven matrix elements for neutrino-less double beta decay. First results are found in

Heavy-ion double charge exchange reactions: A tool toward $0\nu\beta\beta$ nuclear matrix elements F. Cappuzzello et al., European Physical Journal A (2015) 51: 145. DOI 10.1140/epja/i2015-15145-5.

- **Structure of light nuclei:** I have proposed and participated to several experiments in Italy, France, Brazil, Japan and Canada to study the structure of various light nuclei

Excited states of ^{11}Be F. Cappuzzello et al., *Physics Letters B* 516 (2001) 21-26 DOI: 10.1016/S0370-2693(01)00940-6

Investigation of the ^{10}Li shell inversion by neutron continuum transfer reaction, M. Cavallaro, M. De Napoli, F. Cappuzzello et al., *Phys. Rev. Lett.*, accepted 17 November 2016. <http://journals.aps.org/prl/accepted/6b07dY06A2315e5710d2055486e43cac795f64f40>

Main responsibilities

- Spokesperson of SPEME experiment of INFN (2010-2011) (about 100k€/year, about 10 researchers)
- Spokesperson of DREAMS experiment of INFN (2012-2015) (about 100k€/year, about 15 researchers)
- Spokesperson of a MOU between INFN–LNS and IN2P3-IPN-Orsay (France) (2011-2017) (26 researchers)
- Spokesperson of a MOU between INFN–LNS, IFUSP (San Paolo, Brazil), IFUFF (Niteroi, Brazil) (2011-2018) (27 researchers)
- Co-Spokesperson of a MOU between INFN–LNS and Akdeniz University (Turkey) (2016-2018) (100 k€, 20 researchers)
- Spokesperson of the NUMEN project of INFN (2016-2018) (2M€, more than 70 researchers)
- Local Responsible of the WP15 - JRA7 TechIBA “Technologies for High Intensity Beams and Applications”. Grant Agreement number: 654002 — ENSAR2 — H2020-INFRAIA-2014-2015/H2020-INFRAIA-2014-2015 (100 k€, 3 researchers) (2016-2020)
- Principal Investigator of the project “Studio dell'elemento di matrice del doppio decadimento beta mediante reazioni nucleari”, University of Catania, Fondi FIR 2014 (project code: D41BCC, budget 15 k€, 8 researchers) (2015-2017)

Main publications and editorial activity

- Total papers: 2 review papers, about 110 articles ISI or SCOPUS, H = 15
- Reviewer of Nature Physics, Nuclear Physics A, Nuclear Instrument and Methods, Journal of Physics G, Few-Body Systems, Advances in High Energy Physics.

International conferences, workshops and schools

- **Chairman** of the next International *Conference on Neutrino and Nuclear Physics*, to be held in Catania in October 2017
- **Chairman** of the International Workshop *NUMEN 2015 – Challenges in the investigation of double charge-exchange nuclear reactions: towards neutrino-less double beta decay*, 1-2 December 2015, Catania, Italy
- **Chairman** of the International Workshop *MAGNET 2010 – Nuclear Physics with Modern Magnetic Spectrometers*, 14-16 December 2010, Catania, Italy
- **Member of the International Advisory Committee** of the Conference Nuclear Reaction Mechanisms, from the 14th edition 15-19 June 2015, Varenna, Italy
- **Member of the International Advisory Committee** of the *Mexican Symposium on Nuclear Physics*, from the 40th edition to be held in Cocoyoc, Morelos, 5-9 January 2017, Mexico

- **Member of the International Advisory Committee** of the 12th International Spring Seminar on Nuclear Physics “Current Problems and Prospects for Nuclear Structure” to be held in Sant’Angelo d’Ischia, 15-19 May 2017, Italy.
- **Panel member** for Workshop on Nuclear Physics in South Africa, at i-Themba LABS (Cape Town) October 26-28 2016, Cape Town, South Africa
- **Speaker** of 83 talks, 58 of which invited.
- **Invited Session Chair**: 5

Proposed experiments in international research laboratories

- Approved experiments proposed as Spokesperson: 26

Reviewer for international institutions

- Referee of research projects for the *Natural Sciences and Engineering Research Council of Canada* (NSERC)
- Referee of research projects for the *Croatian Science Foundation* (CSF)
- Member of the *Panel of International Experts* for the *Long Range Plan* of the i-Themba LABS, South Africa.

Prices and awards

- Awarded for *Outstanding Contribution in Reviewing* from Nuclear Physics A in 2015

Didactic activity

2007-2009 *General Physics I* for the Master Degree in Computing Sciences and Earth Sciences

2009-2011 *Nuclear Spectroscopy* for the Master Degree in Physics

2009-2011 *Heavy-Ion Physics* for the Master Degree and Ph.D. in Physics

2012-2015 *Nuclear Structure* for the Master Degree and Ph.D. in Physics

2015-2016 *Search of New Physics Beyond the Standard Model in $\beta\beta$ Decay* for Ph.D. in Physics

2016 Lecturer of the 3rd International Nuclear Physics Summer School (NUBA-2016) held on May 29–June 5, 2016 in Antalya, Turkey

2013- Member of the Ph.D. course *Dottorato di Ricerca in Fisica* of the University of Catania

Participation to international didactic committees

- Invited “Jury de These”, Service des Etudes Doctorales, Université Paris-Sud 11, Orsay, 3 Dec. 2010

Tutoring responsibilities

I had and have the pleasure and responsibility to train and introduce to research activity several young students from different countries (11 Master Degree, 8 Doctor of Philosophy and 4 Post-Doctoral). Some of them have already completed their training and are now approaching their activity in public research or in private companies. I should mention here Drs. Manuela Cavallaro, who has recently got the prestigious “ERC Starting Grant” from the European Research Council with a project with important synergies with NUMEN. Drs. Simona Boninelli has now a permanent position as researcher at CNR in solid state physics. Drs. Sonja Orrigo is now researcher at the Valencia University. Drs. Maria Schillaci got a permanent position at Swiss

Telecom, in the field of telecommunication. Dr. Dario Nicolosi got a permanent position at the Saes Getter company, in the field of vacuum technologies. Drs. Stefania Tropea got a permanent position at the TRESAN company, in the field of solar power technologies. All the other are still completing their training in research.

- Tutor of Master Degree Students

1. **Drs. Simona Boninelli:** *Studio della reazione $^{15}\text{N}(^7\text{Li}, ^7\text{Be})^{15}\text{C}$ indotta a 52 e 57 MeV;* tutors: Prof. A. Cunsolo, Dr. F. Cappuzzello. Master Degree, University of Catania, AA 2000-2001
2. **Drs. Sonja Orrigo:** *Spettroscopia del ^{14}B via $(^7\text{Li}, ^7\text{Be})$: test e progetto di misura con MAGNEX;* tutors: Prof. A. Cunsolo, Dr. F. Cappuzzello. Master Degree, University of Catania, AA 2000-2001
3. **Drs. Manuela Cavallaro:** *Stati dell' ^{19}O popolati nella reazione $^{19}\text{F}(^7\text{Li}, ^7\text{Be})^{19}\text{O}$ a 56 MeV;* tutors: Prof. A. Cunsolo, Dr. F. Cappuzzello. Master Degree, University of Catania, AA 2003-2004
4. **Drs. Diana Carbone:** *Studio della reazione $^{13}\text{C}(^{18}\text{O}, ^{16}\text{O})^{15}\text{C}$ a 84 MeV con MAGNEX;* tutors: Prof. A. Cunsolo, Dr. F. Cappuzzello. Master Degree, University of Catania, AA 2007-2008.
5. **Drs. Maria Schillaci:** *Ricerca della strength di Gamow-Teller nella $^{28}\text{Si}(^7\text{Li}, ^7\text{Be})^{28}\text{Al}$ con MAGNEX e la tecnica di ricostruzione delle traiettorie;* tutors: Prof. A. Cunsolo, Dr. F. Cappuzzello. Master Degree, University of Catania, AA 2008-2009
6. **Dr. Gianluca Santagati:** *Studio della reazione $^{64}\text{Ni}(^{18}\text{O}, ^{16}\text{O})^{66}\text{Ni}$ a 84 MeV con lo spettrometro MAGNEX;* tutors: Prof. F. Cappuzzello, Drs. M. Cavallaro. Master Degree, University of Catania, AA 2009-2010
7. **Drs. Mariangela Bondì:** *Studio della reazione $^{12}\text{C}(^{18}\text{O}, ^{16}\text{O})^{14}\text{C}$ a 84 MeV con MAGNEX;* tutors: Prof. F. Cappuzzello, Drs. D. Carbone. Master Degree, University of Catania, AA 2010-2011
8. **Dr. Gabriele Taranto:** *Stati del ^{11}Be popolati nella reazione $^9\text{Be}(^{18}\text{O}, ^{16}\text{O})^{11}\text{Be}$ a 84 MeV con lo spettrometro MAGNEX;* tutors: Prof. F. Cappuzzello, Drs. M. Cavallaro. Master Degree, University of Catania, AA 2010-2011
9. **Dr. Salvatore Calabrese:** *Experimental Investigation of the $^{116}\text{Sn}(^{18}\text{O}, ^{18}\text{F})^{116}\text{In}$ Charge Exchange Reaction in the context of NUMEN project;* tutors: Prof. F. Cappuzzello, Drs. M. Cavallaro, Drs. D. Carbone. Master Degree, University of Catania, AA 2015-2016
10. **Dr. Onofrios Sgouros:** Lifelong Learning Program/ERASMUS University of Ioannina, Greece
11. **Dr. Vasileios Soukeras:** Lifelong Learning Program/ERASMUS University of Ioannina, Greece

- Tutor of Ph.D. students

1. **Drs. Diana Carbone,** *First experimental evidence of the Giant Pairing Vibration in atomic nuclei,* University of Catania, XXV ciclo Dottorato di Ricerca. This work was awarded as Best Thesis from the III National Committee of INFN in 2013
2. **Dr. Dario Nicolosi,** *Evidence of Nuclear Rainbow in the $^{16}\text{O} + ^{27}\text{Al}$ elastic scattering @ 280 MeV,* University of Catania, XXVI ciclo Dottorato di Ricerca
3. **Drs. Stefania Tropea,** *Experimental Study on Carbon Fragmentation for Hadrotherapy,* University of Catania, XXVI ciclo Dottorato di Ricerca
4. **Dra. Mariangela Bondì,** *Heavy-ion double charge exchange reactions as tools for $0\nu\beta\beta$ decays. The $^{40}\text{Ca}(^{18}\text{O}, ^{18}\text{Ne})^{40}\text{Ar}$ reaction at 270 MeV by using MAGNEX,* University of Catania, XXVI ciclo Dottorato di Ricerca
5. **Dr. Vantelfo Nunes Garcia,** *Análise sobre o emparelhamento entre dois nêutrons na reação $^{12}\text{C}(^{18}\text{O}, ^{16}\text{O})^{14}\text{C}$,* Universidade Federal Fluminense, 2013, Niteroi, Brasil
6. **Dr. Jonas Leonardo Ferreira,** Universidade Federal Fluminense, Sandwich doctor studies at the INFN-LNS laboratory (Catania) within the INFN NUMEN project

7. **Drs. Grazia D'Agostino**, University of Catania, XXXI ciclo Dottorato di Ricerca
8. **Dr. Salvatore Calabrese**, University of Catania, XXXII ciclo Dottorato di Ricerca

- Tutor of Post-Doctoral Fellowships

1. **Dr. Nikit N. Deshmukh**, INFN Post-Doctoral Fellowship, 1-year renewable starting from 1 March 2016
2. **Drs. Aylin Hacisalihoglu**, Scientific and Technological Research Council of Turkey (TUBITAK) 2214/A International Doctoral Research Fellowship Programme November 2016 – November 2017
3. **Dr. Vinicius Bocaline Zagatto**, Post-Doctoral Fellowship for Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). Program: “Ciencia Sem Fronteira”. Modality: Pos-doutorado no Exterior Process number: 205864/2014-7, April 2015 - April 2016

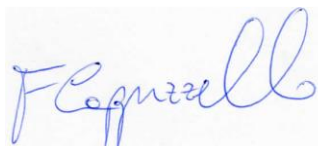
Drs. Diana Carbone, *Misure di sezioni d'urto di reazioni dirette fra ioni pesanti per studi di Fisica Nucleare e Astrofisica Nucleare*, Post-Doctoral Fellowship Assegno di Ricerca INFN, October 2015 – September 2017

Outreach activities

- Co-Author of three articles published by the "La Sicilia" newspaper distributed in Italy
- Co-Author of three articles published by the “Il Sole 24 ore” (main newspaper for economics in Italy)
- Interviewed by the journalist Sylvie Coyaud in the program “Le Oche” of the “Radio Popolare” national radio broadcast (<http://www.radiopopolare.it/podcast/le-ocche-di-ven-0304/>)
- Author of one article in the “Bollettino di Ateneo” journal of the Catania University (<http://bollettino.unict.it/articoli/la-risonanza-gigante-di-pairing>)
- The scientific article *F. Cappuzzello et al. Nature Communications 6 (2015) 6743* was the object of a dedicated blog in the “La Repubblica D” national on-line news-paper, moderated by the journalist Sylvie Coyaud (<http://ocasapiens-dweb.blogautore.repubblica.it/2015/04/03/le-ocche-9-good-vibrations/>)
- Co-Author of F. Cappuzzello, D. Carbone, M. Cavallaro, A. M. Muoio “La Risonanza Gigante di Pairing nei nuclei atomici: un nuovo ballo di gruppo”, published by Scienze e Ricerche N.39 (2016). <http://www.scienze-ricerche.it/?p=11152>
- Speaker of tens of accompanied visit of the MAGNEX spectrometer at the INFN-LNS

Catania October 6th 2017

Francesco Cappuzzello



Curriculum vitae of Manuela Cavallaro

PERSONAL INFORMATION

Name: Cavallaro Manuela
e-mail: manuela.cavallaro@lns.infn.it
Nationality: Italian

EDUCATION

- 2009 PhD in Physics (Final dissertation cum laude) “*First Application of the MAGNEX spectrometer: investigation of the $^{19}\text{F}(^7\text{Li},^7\text{Be})^{19}\text{O}$ reaction at 52.2 MeV*”. Supervisor: Prof. Angelo Cunsolo. University of Catania, Italy
- 2004 Master Degree in Physics (Final grade: 110/110 cum laude) “*Stati dell’ ^{19}O popolati nella reazione $^{19}\text{F}(^7\text{Li},^7\text{Be})^{19}\text{O}$ a 56 MeV*”. Supervisor: Prof. Angelo Cunsolo. University of Catania, Italy

CURRENT AND PREVIOUS POSITION

- Apr2017-today Senior Researcher, INFN - Laboratori Nazionali del Sud, Italy
- Oct2016-Mar2017 Researcher (ex art. 20), INFN - Laboratori Nazionali del Sud, Italy
- 2014-2016 Two-years Researcher (ex art. 2222), INFN - Laboratori Nazionali del Sud, Italy
- 2014 Invited researcher at UFF (Universidade Federal Fluminense) RJ, Brasil
- 2012-2014 Post Doctoral Researcher, INFN - Laboratori Nazionali del Sud, Italy
- 2012 Post Doctoral Researcher, Centro Siciliano di Fisica Nucleare e Struttura della Materia, Italy
- 2010-2011 Post Doctoral Researcher, INFN - Laboratori Nazionali del Sud, Italy
- 2009 Post Doctoral Researcher, Department of Physics, University of Catania, Italy

FELLOWSHIPS

- 2012-2014 Post Doctoral grant (assegno di ricerca). Agency: INFN
- 2012 Post Doctoral grant. Agency: Centro Siciliano di Fisica Nucleare e Struttura della Materia
- 2010-2011 Post Doctoral grant (assegno di ricerca). Agency: INFN
- 2009 Post Doctoral grant (assegno di ricerca). Agency: University of Catania
- 2005-2008 Ph.D. studentship grant. Agency: University of Catania
- 2005 Graduate student fellowship. Agency: INFN
- 2004 Undergraduate student fellowship. Agency: INFN

FUNDED PROJECT WITHIN COMPETITIVE CALL

- **PRINCIPAL INVESTIGATOR** of the project NURE (NUclear REactions for neutrinoless double beta decay) funded within the the call **Starting Grant 2016** of the European Research Council (**ERC-2016-STG**).
Duration of the project: 5 years
Budget: 1.272 M€
Host institution: INFN
- **Proponent** of the project SiCILIA (Silicon Carbide detectors for Intense Luminosity Investigations and Applications) funded by INFN Comm. Naz. V within “Call2015”.
Duration: 3 years
Budget: 0.9 M€

AWARDS

- 2014 **Best Young Speaker Award** at “II Topical Workshop on Modern Aspects in Nuclear Structure”, Bormio 19-22 February 2014, presenting the talk: “Extracting spectroscopic information from (^{18}O , ^{16}O) two-neutron transfer reactions”.
- 2010 **First prize** as best communication in Nuclear Physics at “Congresso Nazionale Società Italiana di Fisica” presenting the results of the PhD thesis about the study of (^7Li , ^7Be) charge-exchange reaction with MAGNEX.

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

- Co-supervisor of **2 PhD students** (Diana Carbone, thesis on the Giant Pairing Vibration awarded by INFN as best thesis in experimental nuclear physics -Premio Villi- in 2014, presently INFN researcher, and Mariangela Bondì, thesis on the study of double charge-exchange reactions induced by heavy-ion beam, presently Post-Doc). University of Catania.
- Co-supervisor of **3 master degree students** (Gianluca Santagati and Gabriele Taranto, presently Post-Doc, Salvatore Calabrese, presently PhD student) and **1 undergraduate** student (Iolanda Indelicato, presently Post-Doc). University of Catania.

TEACHING ACTIVITIES

- 2017 Lecturer for “INFN Incontri di Fisica”, Frascati, October 4-6, 2017
- 2017 Tutor for the school “Rewriting Nuclear Physics Textbooks: Basic nuclear interactions and their link to nuclear processes in the cosmos and on earth”, Pisa, 24-28 July 2017.
- 2017 Lecturer for “XXVI Giornate di studio sui rivelatori – Scuola F. Bonaudi”, Cogne (AO), February 13-17, 2017.
- 2014–2015 Lecturer (docente a contratto) for “didactic laboratory of mechanics and thermodynamics”, University of Catania.

- 2014 Lecturer for “IV Seminario Nazionale Rivelatori Innovativi INFN”, Catania, November 10–14, 2014.
- Since 2003 Tutorial activity and lectures (cultore della materia) for the classes “Didactic laboratory of mechanics and thermodynamics”, “General Physics and Applications”, “Nuclear Spectroscopy”, “Heavy Ions Physics”, “Nuclear Physics”, “Radioactivity”, University of Catania.

ORGANISATION OF SCIENTIFIC MEETINGS

- Local Organizing committee of “Conference on Neutrino and Nuclear Physics”, Catania, October 15-21, 2017.
- Local Organizing committee of “HIB@LNS International Workshop on High Intensity cyclotron beam at LNS”, Catania, December 14-15, 2015.
- Local Organizing committee of “NUMEN International workshop - Challenges in the investigation of double charge-exchange nuclear reactions: towards neutrinoless double beta decay”, Catania, December 1-2, 2015.
- Local Organizing committee of “IV Seminario Nazionale Rivelatori Innovativi INFN”, Catania, November 10–14, 2014.
- Scientific secretary for “MAGNET 2010-International Workshop on Nuclear Physics with Modern Magnetic Spectrometers”. Catania, December 14–16, 2010.

INSTITUTIONAL RESPONSIBILITIES

- **Spokesperson** of the in-beam experiments belonging to the NURE project at INFN-LNS, involving around 40 researchers from Italy, Turkey, Brasil, France, Romania, Greece.
- **Spokesperson** of 4 experiments approved by the INFN-LNS International Scientific Committee. The experiments involve people from different international institutions (France, Canada, Germany, Japan, Romania, Belgium and Denmark).
- **Responsible** of the installation and operation of the EDEN neutron detector array from IN2P3 coupled with the MAGNEX spectrometer as declared in the Memorandum of Understanding (MoU) signed in 2010 between the Italian INFN and the French IN2P3.
- **Responsible** of the operation of the MAGNEX magnetic spectrometer at INFN – LNS since 2008.
- **Facility coordinator** and **beam coordinator** for the NUMEN project (WP_1).
- **Responsible** of the gas tracker for the future MAGNEX focal plane detector in the NUMEN project (WP_3).

COMMISSIONS OF TRUST

- **Reviewer** for “Nuclear Instruments and Methods in Physics Research: Section A”, Elsevier, “Physics Letters B”, “IOP-Conference proceedings”.

- **Evaluator** of the poster session at the 36th Workshop on Nuclear Physics, Maresias, Sao Sebastiao, Brazil, Sept. 1-5, 2013.

MEMBERSHIP OF SCIENTIFIC SOCIETIES

- Member of the Italian Physics Society (SIF)
- Associate to the European Center of Theoretical Studies in Nuclear Physics and Related Areas (ECT*) since 2011
- Associate to INFN since 2003

COLLABORATION AND PARTICIPATION TO NATIONAL AND INTERNATIONAL RESEARCH GROUPS

- Research groups of “**INFN Commissione Nazionale III**”: MAGNEX_EXP (spokesperson A. Cunsolo) 2003-2007, SPEME (spokesperson F. Cappuzzello) 2008-2011, DREAMS (spokespersons C. Agodi, F. Cappuzzello) 2012-2015, NUMEN_gr3 (spokespersons C. Agodi, F. Cappuzzello) 2016-today.
- Research group of “**INFN Commissione Nazionale V**”: SiCILIA (spokesperson S. Tudisco) 2016-today.
- Active participation to over 30 **experiments** with accelerated beams approved by International Scientific Committees and involving international collaborations at INFN - LNS and LNL (Italy), TRIUMF (Canada); GANIL (France); RCNP (Japan); MLL (Germany); IPN (France), IFUSP (Brazil); Spokesperson of 4 of them.
- Invitation to work in 2010 at **Michigan State University** (MSU) to perform ion optics calculation for the design of a new large acceptance isochronous spectrometer in the ReA12 facility at NSCL/FRIB.
- Responsible of the installation and operations of the MAGNEX-EDEN facility at LNS, as declared in the **MoU** INFN - **IN2P3**.
- Official collaboration with **IFUFF and IFUSP Universities** (Brazil) as results from the **MoU** signed between the INFN and the Brazilian institutions (2011- 2018).
- **Invited researcher** at IFUFF (Brazil) in 2014.
- Official collaboration with **Akdeniz University (Turkey)** as results from the MoU signed between the INFN and the Turkish institution (2016- 2018).
- Official collaboration with **Casablanca University (Morocco)** as results from the MoU signed between the INFN and the Moroccan institution (2016- 2018).
- MoU in preparation between INFN and **University of Ioannina (Greece)** and INFN and University of Mexico City.

INVITED TALKS AT INTERNATIONAL CONFERENCES AND WORKSHOPS

- T1) *“The role of pairing in heavy-ion induced transfer reactions”*. LASNPA & WONP-NURT Conference, l’Havana, Cuba, 23-27 October 2017.
- T2) *“NURE: an ERC project to “measure” the nuclear matrix elements”*. XVII

- International Conference on Neutrino telescopes, Venezia, Italy, 13-17 March 2017
- T3) “*Nuclear Reactions for Neutrinoless Double Beta Decay*”. 55th International Winter Meeting on Nuclear Physics, Bormio, Italy, 23-27 January 2017.
- T4) “*Nuclear Reactions for Neutrinoless Double Beta Decay*”. Unraveling the complexity of nuclear systems: single-particle and collective aspects through the looking glass, ECT* Trento, February 6-10, 2017.
- T5) “*Exploring the ^{10}Li structure by the $d(^9\text{Li},p)^{10}\text{Li}$ transfer reaction*”. Physics beyond the limits of stability: exploring the continuum, ECT* Trento, Oct. 17-21, 2016.
- T6) “*Giant pairing resonances and two nucleon transfer reactions*”. Nuclear Structure 2016, Knoxville, Tennessee, USA, July 24-29, 2016
- T7) “*Transfer reactions and neutron decay studies by the MAGNEX-EDEN facility*”. Joint LIA COLL-AGAIN, COPIGAL and POLITA workshop on Nuclear Structure and Reactions – Catania, Italy, April 26-29, 2016
- T8) “*The Giant Pairing Vibration in ^{14}C and ^{15}C nuclei*”. 39th Symposium on Nuclear Physics – Cocoyoc, Mexico, January 5-8, 2016
- T9) “*Double charge-exchange reactions: a tool towards neutrino-less double beta-decay nuclear matrix elements*”. XXXIV Mazurian Lakes Conference on Physics – Piaski, Poland, September 6-13, 2015.
- T10) “*Signatures of the Giant Pairing Vibration in ^{14}C and ^{15}C nuclei*”. XXI International School on Nuclear Physics and Applications & International Symposium on Exotic Nuclei – Varna, Bulgaria, September 6-12, 2015.
- T11) “*Extracting spectroscopic information from ($^{18}\text{O},^{16}\text{O}$) two-neutron transfer reactions*”. 2nd International workshop on neutron-proton correlations, University of Hong Kong, July 6-9, 2015.
- T12) “*Extracting spectroscopic information from ($^{18}\text{O},^{16}\text{O}$) two-neutron transfer reactions*”. Sicily-East Asia Workshop on Low-energy Nuclear Physics, Siracusa, Italy, July 28-31, 2014.
- T13) “*Pairing in light neutron-rich nuclei*”. 37th Workshop on Nuclear Physics, Maresias, Sao Sebastiao, Brazil, September 8-12, 2014.
- T14) “*Transfer reaction studies with MAGNEX*”. 36th Workshop on Nuclear Physics, Maresias, Sao Sebastiao, Brazil, September 1-5, 2013.
- T15) “*Nuclear response to two-neutron transfer via the ($^{18}\text{O},^{16}\text{O}$) at 84 MeV*”. 11th International Conference on Nucleus-Nucleus collisions, San Antonio, USA, May 27 - June 1, 2012.
- T16) “*Nuclear response to two-neutron transfer reactions*”. 56th DAE Symposium on Nuclear Physics, Department of Nuclear Physics, Andhra University, Visakhapatnam, India, December 26-30, 2011.
- T17) “*Nuclear response to two-neutron transfer reactions*”. 5th LEA-Colliga workshop, IPN-Orsay, France, November 14-16, 2011.

INVITED SEMINARS AT INTERNATIONAL INSTITUTIONS

- S1) Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou, June 2014
“The MAGNEX spectrometer: an innovative tool for nuclear reaction studies”.
- S2) LRSA, Department of Physics, Faculty of Science Ben M'Sik, University Hassan II

Mohammedia, Casablanca, Morocco, March 2013, “*Two-neutron transfer reactions and pairing correlation in nuclei*”.

S3) Institute of Physics, University of Sao Paulo, Brazil, September 2012: “*Two-neutron transfer reactions and pairing correlations in nuclei*”.

S4) IPN-Orsay, France, May 2010: “*Recent results on the MAGNEX spectrometer at INFN – LNS*”.

SCIENTIFIC OUTPUTS

- 126 **publications** in refereed international journals (of which 1 Nature Communications, 1 invited review paper, 1 book chapter, 33 as first author and/or corresponding author). More than 600 citations.
- 25 **activity reports**.
- 39 **talks**, of which 17 **invited talks**, selected by advisory committees at well-established national and international conferences.
- 4 **invited seminars** at international institutions.
- **H-index** 15 (ISI, SCOPUS database).

Catania, 25/11/2017

Manuela Cavallaro