Torino, 2 agosto 2018

Curriculum dell'attività scientifica
Roberto Cirio

Mi sono laureato in Fisica a Torino nel 1983. Ho trascorso un periodo di 4 anni, tra il 1983 e il 1987, al CERN. Dal 1988 al 2007 sono stato dipendente presso la Sezione di Torino dell'Istituto Nazionale di Fisica Nucleare – INFN (Ricercatore e, dal 1999, Primo Ricercatore). Dal 1 ottobre 2007 sono Professore di I fascia presso la Scuola di Medicina dell'Università di Torino, Cattedra di Fisica al Corso di Studi in Medicina e Chirurgia. Afferisco al Dipartimento di Fisica.
Nel periodo 1983 – 2000 ho contribuito a esperimenti di fisica delle particelle elementari (DELPHI e CMS al CERN, ZEUS a DESY). Ho iniziato nel 1993 a interessarmi di applicazioni della fisica in medicina, in particolare a strumentazione per radioterapia con adroni e convenzionale.
Dal 1994 al 2005 sono stato Responsabile Nazionale di tre esperimenti INFN, finalizzati alla progettazione e costruzione di strumentazione per il controllo e la dosimetria di fasci terapeutici di adroni; su questa tematica ho partecipato a un PRIN. Nell'ambito dei questi esperimenti è stato sviluppato un dosimetro per radioterapia convenzionale, ora prodotto dalla IBA Dosimetry (MatriXX e la sua versione modificata Startrack) venduto in più di 2500 esemplari nei reparti di radioterapia di tutto il mondo. Sono stato Direttore Scientifico dell'Istituto Scientifico Europeo (ISE) dal 1997 al 2005, organizzando oltre trenta Conferenze, Workshop e Corsi su argomenti di fisica applicata alla medicina. Dal 2004 al 2011 sono stato Responsabile del progetto Nozzle del Centro Nazionale di Adroterapia Oncologica (CNAO) di Pavia. Al CNAO sono curate neoplasie con la radioterapia con protoni e carbonio e il gruppo del quale ho avuto la responsabilità ha costruito le apparecchiature per il controllo del fascio. Sono coautore di un brevetto internazionale e sono stato tra i fondatori di due società spin-off di UniTo e INFN (DeTecTor e ISEE). Ho partecipato a tre progetti FP6 e FP7 dell'Unione Europea (MAESTRO, ENLIGHT, ENVISION).
Sono coautore di oltre 250 pubblicazioni su riviste e referee di Medical Physics, Physics in Medicine and Biology, Radiation Measurements, Medical and Biological Engineering in Computing, Nuclear Instruments and Methods in Physics Research.
Dal 2011 al 2013 sono stato Vicepresidente dell'AIFM (Associazione Italiana di Fisica Medica).

I graduated in Physics in Turin in 1983. I spent a period of 4 years, between 1983 and 1987 at CERN. From 1988 to 2007, I was an employee at the Turin Section of the National Institute of Nuclear Physics - INFN (Researcher and, since 1999, First Researcher). From 1 October 2007 Full Professor at the School of Medicine of the University of Turin, Chair of Physics. I am working in the Physics Department of the University of Torino.
In the period 1983-2000 I participated to experiments of elementary particle physics (DELPHI and CMS at CERN, ZEUS at DESY). Since 1993, I work on applications of physics in medicine, in particular on instrumentation for radiotherapy with hadrons and photons. From 1994 to 2005, I was responsible for three INFN experiments, aimed at the design and construction of instrumentation for the control and dosimetry of therapeutic beams of hadrons; on this subject, I participated to a PRIN. In the context of these experiments it was developed a dosimeter for conventional radiation therapy, now produced by IBA Dosimetry (MatriXX and its modified version Startrack) sold in more than 2500 items to radiotherapy departments around the world. I was Scientific Director of the European Scientific Institute (ISE) from 1997 to 2005, organizing over thirty Conferences, Workshops and Courses on topics of physics applied to medicine. In the period 2004-2011, I have been head of the project Nozzle for the National Center of Oncological Hadrontherapy (CNAO) in Pavia. CNAO treats cancer with radiation therapy using protons and carbon ions, and the Group of which I had responsibility has built the equipment for the control of the beam. I am co-author of one international patent and I have been co-founder of two spin-off companies of UniTo and INFN (DeTecTor and ISEE). I participated to 3 European Community projects of FP6 and FP7 programs (MAESTRO, ENLIGHT, ENVISION).
I am coauthor of over 250 publications in journals and referee of Medical Physics, Physics in Medicine and Biology, Radiation Measurements, Medical and Biological Engineering in Computing, Nuclear Instruments and Methods in Physics Research.
In the period 2011-2013 I have been Vice-president of AIFM (Italian Association of Medical Physics).

Roberto Calabrese – Short Curriculum Vitae

Born in Bari (Italy) in 1958. Graduate in Physics in 1981 (110/110 cum laude) at University of Pisa; "perfezionando" at Scuola Normale Superiore Pisa (1981-1983); fellowship at ENS Paris (1983); assistant professor (1983-1992), associate professor (1992-2007), full professor of Experimental Physics (2007 - today), University of Ferrara.

Dean of the Faculty of Science of Ferrara University, 2010-2012.

Director of the Department of Physics and Earth Sciences of Ferrara University, 2012-today.

Member of the National Scientific Committee 1 (Particle Physics) of INFN, the National Institute of Nuclear Physics, 1992-1998.

Scientific coordinator of the Italian collaboration (INFN groups of Ferrara, Genova and Torino) of E835 experiment, charmonium spectroscopy at Fermilab, 1998-2005.

Scientific coordinator of the Italian collaboration (INFN groups of Ferrara, Legnaro, Pisa and Siena) of the TRAPRAD and FRANCIUM experiments, trapping of francium atoms for fundamental physics studies, 2001-2012.

PI (together with A. J. S. Smith, Princeton University) of the new barrel muon detector for the BaBar experiment at SLAC, Stanford, built by a collaboration of INFN groups (7 Institutions) and US groups (6 Institutions), 2003-2008.

Chairman of the Program Advisory Committee of "Kernfysisch Versneller Instituut" (KVI), an international laboratory devoted to the studies of fundamental physics and nuclear physics, Groningen, Netherlands, 2006-2014.

Scientific coordinator of the Italian collaboration (INFN groups of 12 Institutions) of BaBar experiment at SLAC, Stanford, study of decays of B mesons, 2008-2017.

Team leader of the Ferrara RICH group, LHCb experiment at CERN, 2013-today.

Member of the Evaluation Panel for 'Progetti Premiali' of the Italian Public Research Institutions, 2016-2017

Member of the CERN Large Hadron Collider Experiments Committee (LHCC) , January 2018-today

Supervisor of 19 PhD students and responsible of more than 10 post-doc grants.

Research interests:

−Particle physics (1983-today): measurements of electromagnetic form factors of the proton and neutron in the time-like region, charmonium spectroscopy, study of the B meson decays, test of the Standard Model of particle physics.

-Accelerator, detector and laser physics (1983-today): electron cooling and related laser diagnostics, ultracold gallium arsenide electron source, "white-light" laser cooling, magneto-optical traps,

trapping of francium atoms. Development of innovative detectors and related electronics.

Bibliometric indicators (ISI-Web of Science, March 2018): - number of articles published on International journals: 945 - number of citations received by these articles: 23259 - H-index: 87

Curriculum Vitae of Donatella Lucchesi

Address Department of Physics and Astronomy
University of Padova
via Marzolo 8 35131 Padova – Italy
Phone (39) 049 827 7253
Email donatella.lucchesi@pd.infn.it
Born February 29, 1964 in Lucca Italy
Citizenship Italian

Academic Career:
January 2014: qualification as Full Professor (SC02/A1)
October 2010 - present: Associate Professor, University of Padua, confirmed since October 2013
October 2006 - October 2010: Researcher at the University of Padua
April 2005 October 2006: Fixed-term researcher at the National Institute of Nuclear Physics - Padua
March 2001 April 2005: Research Grant University of Padua
February 1999-February 2001: Post-doctoral scholarship University of Padua
July 1995-July 1997: Post-doctoral fellowship of National Institute of Nuclear Physics - Pisa
October 1991-September 1994: doctorate in physics, University of Catania
July 1990: degree in Physics, University of Pisa
July 1987: Summer student at Fermi National Laboratory

Research Activities
1989-1990 WA84 at SPS of CERN to study of the hadron production and decays of the B mesons for her laurea thesis. The novelty of the experiment was the use of a scintillating optical fiber device with high spatial resolution used both as a vertex detector and as target.

1991-1994 CDF at the Tevatron Collider
Donatella Lucchesi collaborates to the upgrade of the CDF muon detector and the subsequent commissioning. The events collected in the first two years of data taking was used for the measurement of the mixing frequency in the $B^0 - \bar{B}^0$ system. This measurement was considered not possible for an experiment at hadronic collider because of the high background respect to the LEP collider experiments, where the mixing frequency had been determined for the first time. Donatella Lucchesi develops an analysis technique for the reconstruction of physical quantities as a function of the proper decay time that allow the measurement of this important parameter of the Standard Model for the first time to a hadron collider.

1995-1998 R & D for CDF and CLUE experiment
Donatella Lucchesi participates in the studies of a scintillating optical fiber detector that was supposed to replace the CDF Vertex Tracking Chamber marker placed between the silicon vertex detector and the central drift chamber. In the same period Donatella Lucchesi collaborates also with the experiment CLUE (Cerenkov Light Ultraviolet Experiment) which aimed to evaluate the ratio matter/antimatter in the universe by studying the showers produced by the interaction of the primary cosmic radiation with the atmosphere.

1999-2001 CDFII: detector upgrade
Donatella Lucchesi participates to the upgrade of the silicon detector with the group of CDFII of Padua. She also studies the possibility of using the information obtained from this detector by the impact parameter trigger, Silicon Vertex Trigger (SVT), which determines the real-time selection of short-living particles such as the b-hadrons.

2002-2007 CDFII: data analysis

Donatella Lucchesi is part of the group, inside CDFII, dedicated to the measurement of the Bs mixing parameter. She is the author of the analysis that leads to the first observation and measurement of the branching ratio of the decay $B_S \rightarrow D_S\pi$. She coordinates the activities on the determination of the primary vertex event-by-event and she is in charge of the selection of the sample for analysis which is done through a skimming procedure developed using distributed analysis technologies. These were an important contribution to the measurement of the Bs mixing frequency. The development of cutting-edge code for the offline selection of events, then becomes a project that consists in porting CDF analysis to the GRID, coordinated by Donatella Lucchesi. From 2006 to 2013 Donatella Lucchesi is PI of the CDF Padova group.

2008-2011 CDFII upgrade and search for the Higgs boson

From 1 May 2007 to June 2009 Donatella Lucchesi was co-coordinator of computing and data handling at CDF. She participates in the upgrade of the level 2 calorimetric trigger. Together with some colleagues, she proposes the combination of the jet information with those of the tracks in order to select jets with b-quark. Event-rich samples with b-jets have been and are important for the study of the Higgs boson and in the search for new physics to such an extent that even the LHC experiments today are designing similar triggers. The selected sample of events was used to search for the Higgs boson in the low mass region, to determine the energy scale of b-quarks jets and to search for new physics. Two papers describing the analysis are currently submitted for publication.

Donatella Lucchesi participates in the research of the Higgs boson as a supervisor of doctoral students. She collaborates to the analysis of $H \rightarrow WW$ and $H \rightarrow ZZ$ decays reconstruction. A new strategy is identified and adopted to increase the sensitivity. The result of this work is the exclusion of possible masses, for the first time at CDF and in general after the LEP experiments. One of the products of the search for H-> ZZ analysis is the determination of the cross-section of production of ZZ-bosons made by Donatella Lucchesi with a graduate student who then continues the work as a doctoral student.

In 2008 she had approved as scientific coordinator, a European project FP7-PEOPLE-IOF-2008: ITES, Innovative Tools for Event Selection in high energy physics. Together with the project beneficiary, she started an R&D activity for the use of Graphic Processing Units (GPUs) and computers with accelerators for the real-time selection of events produced at new colliders.

2012- 2017 LHCb and computing

At the beginning of 2012 Donatella Lucchesi opens a new research activity at the INFN section of Padua becoming part of the LHCb collaboration, she is the local PI. At the end of 2012, other colleagues from INFN and the University of Padua joined the group that currently consists of 12 units. The group participates to the detector update for the data taking of 2020 collaborating to the RICH detector and to the High Level Trigger. Together with a post-doc she starts a working group within LHCb for the study and development of tracking algorithms using GPUs.

In 2014, supervising the activities of two doctoral students, she began studying the reconstruction of the jets at LHCb with the aim of measuring the production of jets with $b\,\bar{b}$ in the forward region. The first step was the measurement of the cross section $Z \rightarrow b\bar{b}$ at LHCb, recently published, which demonstrated the feasibility of this type of research also in the forward region, thus opening a new research line at LHCb.

At the beginning of 2014 Donatella Lucchesi promoted, together with a French colleague, an initiative for the establishment of a new European collaboration, EU-T0, dedicated to the coordination of the activities of the major LHC computing centers.

In 2015, the INFN established the scientific computing coordination group consisting of nine members representing the various computing activities within the institution. Donatella Lucchesi is the chair of this group.

2017-today New accelerators
Donatella Lucchesi begins to study the production of intense muon beams from positron interactions on target to exploit this technique for a future muon collider. Donatella Lucchesi was invited at Fermilab, in early January, and in Brighton, in May 2018, for a seminar on *Muon collider feasibility: new studies of a low emittance muon source using positron beam*. Currently she coordinates the simulation activities to study the Higgs physics reaches at muon collider.

Major Committees and Commitments

2004-2006 Heavy Flavor Averaging Group member
2005-2009 Coordinator of the Italian CDF computing
2006-2012 PI of the CDF-Padova group
2007-2009 CDF computing and data handling co-head
2009-2011 Member of the INFN review panel for Atlas and CMS
2011 Member of the review panel of ATLAS and CMS Operations Program and of the review panel of Open Science Grid (DOE)
2011-present Chair of the INFN Computing review panel
2012-present Member of the Computing Scrutiny Group CERN
2012 Member of the review panel of ATLAS and CMS Operations Program (DOE)
2012-present PI of the LHCb Padova institution
2013-present Member of the executive board of the department of physics and astronomy of the University of Padova
2013-present Member of the CTS (Technical and Scientific Committee of CNAF-Tier1
2014 Member of the review panel of LBNE (DOE)
2015-today Chair of the INFN Scientific Computing Coordination Group
2016 - today Chair of Cern Computing Resource Scrutiny Group
2014 Member of Scientific Advisory Committee: IFD2014 INFN Workshop on Future Detector for HL-LHC;
2016 Member of ASI Working Group
2017 Local organizing Committee of EPS Conference on High Energy Physics Venice, Italy 5-12 July 2017.
2018-today member of High Energy Physics Advisory Panel (HEPAP)

She has also been a member and chairwoman of several commissions for selection of research doctorates, research grants, fixed-term and permanent research positions.

Major Funded Projects

Donatella Lucchesi had the following funded projects:
- Bando Budget Integrato per la Ricerca Interdipartimentale dell'Università di Padova 2018 *Study of mutli-TeV muon collider limitations due to collider background induced radiation*
- Project of the Ministry of Foreign Affairs for Young Researchers 2015. This project has allowed 16 INFN scholarships
- Junior Reserch grant University of Padua, two years, 2015.
-Senior Research grant University of Padua two years, 2013
-Annual research grant on funds from CERN and Fermilab.
-University of Padova Research Projects, 2012
-Research grant University of Padova, two years, 2009.
-PRIN 2008, PI of the Padua unit,

-Scientific coordinator of the European project FP7-PEOPLE-IOF-2008: ITES.

Major Conferences in the latest years

2004 ICHEP2004 plenary talk *New results for heavy flavors and QCD tests at Tevatron*

2010 ICHEP2010 35th International Conference on High Energy Physics *Standard Model high mass Higgs search at CDF*

2013 ICNFP 2013 2nd International Conference on New Frontiers in Physics 2013 *The LHCb Upgrade*

2015 50th Rencontres de Moriond Recent Heavy Flavor Physics Results from the Tevatron,

2016 ICHEP 2016, USA Chicago, W/Z production at LHCb: implications to QCD.

2017 Les Rencontres de Physique de la Vallée d'Aoste 2017, Top, EWK and Recent Results from CDF and Combinations from the Tevatron

2018 Fermilab Colloquium, Muon collider feasibility: new studies of a low emittance muon source using positron beam

2018 The Sixth Annual Large Hadron Collider Physics conference LHCP 2018 *Top pair production cross sections at LHCb* Invited talk with proceedings

2018 Muon Collider Workshop (ARIES) *Beam induced background* Invited talk

- Education – Academic Achievements

  2014 Appointed with the Italian ASN National scientific qualification for FIS/01- 01/A2 scientific sector
  2002-now Confirmed Associate Professor at S.B.A.I. Department of Rome University "La Sapienza"
  1999-2002 Associate Professor at Energetics Department of Rome University "La Sapienza"
  1992-1999 Permanent Researcher at Energetics Department of Rome University "La Sapienza"
  1992 Visiting Researcher at California Institute of Technology.
  1990-1992 Permanent Researcher at Istituto Nazionale di Fisica Nucleare (INFN) at Frascati National Laboratory (LNF)
  1988-1989 Research grant of INFN at Frascati National Laboratory
  1987 Degree in Elementary Particle Physics: 110/110 cum laude at Rome University "La Sapienza"

  Scientific Responsabilities
  2016-now Spokesperson of the FOOT (FragmentatiOn Of Target) international collaboration (France, Germany, Italy, Japan)
  2016-now Coordinator of the Working Package 5 "Charged detector for Imaging in Particle Therapy" of the European Nuclear Science and Applications Research (ENSAR-2) -MediNet project.
  2014-2016 Principal Investigator (PI) of the NCS@HIT experiment at Heidelberg Ion-Beam Therapy Center (HIT) funded by the Union of Light Ion Centers in Europe (ULICE) Program for the study of the beam fragmentation in Particle Therapy
  2012-2015 PI of the Flagship Project (Progetto Premiale) of the MIUR (Italian Ministry of Education, University and Research) for the Centro Fermi Research Institute: "Multiple source, real-time Imaging for Hadrontherapy"
  2012-2015 PI at "La Sapienza" University of Rome of the PRIN project (Research Project of National Relevance) INSIDE: "Innovative Solution of Imaging and Dosimetry in Hadrontherapy"
  2012-2016 PI of the INFN experiment RDH (R&D in Hadrontherapy) at Roma1 section
  2012-now PI of the project of the Centro Fermi Research Institute: "Innovative non invasive imaging of dose release in hadrontherapy"
  2010-2015 Spokesperson of the FIRST-S361 (Fragmentation of Ions Relevant for Space and Therapy) international collaboration at GSI laboratory (Darmstadt, Germany)
  2009-2012 PI of the INFN project TPS (Treatment Planning System for hadrontherapy) at Frascati National Laboratory of INFN
  2006-2009 PI at "La Sapienza" University of Rome of the PRIN project on "Read-out optimization and DAQ electronics development of a scintillating fiber tracking calorimeter"

  Memberships
  2017 Committee for the assignment of the INFN post-doc fellowships for foreigners
  2016-now Committee for the assignment of the INFN post-doc fellowships at Roma 1 section.
  2013-now Ph.D. School in Accelerator Physics at Rome University "La Sapienza"
  2015-now Specialization School in Medical Physics at Rome University "La Sapienza"
  2012-2014 Users Committee of Laboratori Nazionali del Sud (LNS)
  2010-2014 Scientific Committee of FLUKA international collaboration
  2008-now Policy Board of KLOE-2 (K Long Experiment) experiment at LNF
  2006-2009 Panel for TARI (Transnational Access to Research Infrastracture) funds assignment of the European Network of Underground Laboratories
  2004-2018 Jury for PhD thesis examination at University of Rome "La Sapienza", University of Rome "Tor Vergata", University of Rome "Tre", University of Milano, University of Napoli and University of Torino
  2004-2007 Committee for permanent researcher positions in experimental physics (FIS/01) at Perugia and Lecce Universities
  2003-2009 Panel for TARI funds assignment of Laboratori Nazionali del Gran Sasso (LNGS)

of INFN
2002-2005 Executive Committee of the Energetics Department of Rome University "La Sapienza".
2001-2007 Scientific Committee of LNGS of INFN

Referee/Reviewer activities
2016-now refree for DFG (German Research Foundation) for Nuclear and Medical physics project funding
2005-now referee for MIUR (Italian Ministry of Education, University and Research): VQR (Research Evaluation) 2004-2010, VQR 2011-2014, PRIN and FIRB (Futuro In Ricerca) research project, CIVR (Comitato di Indirizzo per la Valutazione della Ricerca), FARE (Framework per l'Attrazione e il Rafforzamento della Ricerca) research projects of MIUR.
2010-now Reviewer of International Scientific Journals (Physics in Medicine and Biology, Physica Medica, Medical Physics, Journal of Radiation Research, Nuclear Instruments and Methods, Translational Cancer Research, Frontiers in Oncology, Advances in Physics, Transaction of Nuclear Science, IEEE Transactions on Radiation and Plasma Medical Sciences)

Teaching and Training activities
Teaching activity took place within the Faculty of Engineering of the University of Rome "Sapienza" since 1995 until 2017. V.P. was the professor of courses of General Physics II (Electromagnetism), General Physics I (Mechanics and Thermodynamics), Laboratory of Physics, Modern Physics, Radioprotection, Radiation Physics applied to Medicine.
Supervisor of more 34 thesis in the faculty of Engineering and of Mathematical, Physical and Natural Science of the Rome University "Sapienza".
Supervisor of 9 Ph.D. thesis of University of Rome "Sapienza", of University of Rome "Tor Vergata" and University "ROMA 3".
Supervisor of post-doc contracts funded by University "Sapienza", by INFN, by Centro Fermi Research Institute and by Istituto Italiano di Tecnologia (IIT)

Summary of Research Activities

a) 2008-2018: Physics applied to particle therapy and to medical imaging

In 2009 V.P. promoted the birth, and since then coordinates, a group aiming at developing cutting-edge applications of nuclear and particle physics in the field of medical diagnostics and therapy.
This group includes members from "La Sapienza" University of Rome and from Centro Fermi Research Institute, and is collaborating with the GSI Laboratory (Darmstadt, Germany), the HIT Therapy Center (Heidelberg, Germany), the CNAO Centro Nazionale di Adroterapia Oncologica (Pavia, Italy), the IFJ PAN Proton Therapy Center (Krakow, Poland) and with the APSS Proton Therapy Center (Trento, Italy). The group has very close collaborations with several sections of INFN (Bo, LNS, LNF, Mi, Na, Pi, RM2, TIFPA, To).
The group focused on nuclear techniques related with the use of proton and carbon beams for tumor treatment:

• Evaluation of the effects of the ion beam fragmentation in the patient, both in carbon treatment (projectile fragmentation) and proton treatment (target fragmentation). V.P. has been the spokesperson of two international collaborations addressing this issue: S371-FIRST (Fragmentation of Ions Relevant for Space and Therapy; Germany, France, Italy), which took data at GSI in 2011-2012, and the FOOT (FragmentatiOn Of Target) (Germany, France, Japan and Italy), which at present is in construction. The FOOT experiment has been included in the NUPEC 2017 roadmap and has been adopted by the European Space Agency for its research program for radioprotection on space

• Imaging optimization of the dose release in particle therapy treatment. Beam range monitoring during the treatment is one of the major improvement of the quality assurance

of the treatment. It can be achieved exploiting the neutral and charged secondary flux produced by the interaction of the beam with the patient tissue. Due the absence of data about the secondary production V.P. had been the PI of the design, construction, data taking, data analysis, and simulation of several measurement campaigns at LNS, GSI, HIT, CNAO and TIFPA.

• The study of the secondary emission provided the V.P. group with the knowledge necessary for the design of an on-line beam range monitor device, to be used at CNAO. This device is made of a compact tracker to detect charged secondary emission allowing on-line monitoring of carbon beam range. The group led by V.P. designed and built the detector, the front-end electronics, the data acquisition and an innovative on-line reconstruction technique. This activity has been carried out initially within the INSIDE PRIN project and then within the Centro Fermi Project dedicated to the Particle Therapy technology development, in both cases with V.P. as PI.

• V.P. has been deeply involved in Monte Carlo software development applied to medical physics and radioprotection, notably to its use in developing the Treatment Planning System in particle therapy. Such an activity has been carried out within the INFN-CERN FLUKA collaboration (V.P. is a contributing author of the FLUKA code) and within the INFN-TPS collaboration, which produced a commercial Treatment Planning System for carbon and proton. V.P. is coordinating the development of the FRED (Fast paRticle thErapy Dose evaluator) Monte Carlo software that computes on GPU the dose released to the patient by a proton beam reducing the CPU time of two orders of magnitude. That software is under test at CNAO center and at IFJ PAN proton therapy center (Krakow).

• A parallel research stream has been focused on the development of an innovative intraoperative probe for brain surgery in oncology. Such an intraoperative tool, which effectively detects tumor margins in real time, could be a useful surgical adjunct for brain tumor resection. That work provided V.P. of a patent about "Intraoperative detection of tumor residues using β- radiation and corresponding probes, N.PCT/IT2014/000025

b) 1993-today. Study of fundamental discrete symmetries of sub-nuclear interaction and of the quark mixing matrix unitarity.

This research took place within the international KLOE collaboration, that designed and built an apparatus optimized for the study of discrete symmetries (parity inversion, time inversion and charge conjugation) in the quantum system of charged and neutral kaon pairs generated in the decay at rest of phi mesons, and of the unitarity test of the quark mixing matrix (CKM). The KLOE data taking at the DAPHNE electron-positron collider of the Frascati National Laboratory of INFN ended in april 2006.
The contribution of the candidate to the detector was first focused in the design of the charged particle trigger system and in the development of the simulation and reconstruction software of the drift chamber. V.P. was also the coordinator of the analysis group that studied the charged kaon physics. This activity updated all the charged kaon branching ration in literature and led to an updated determination of the Vus element of the CKM quark mixing matrix.
In 2008 V.P. has become a member of Policy Board of the KLOE2 collaboration that extended the KLOE physics program at the renewed DAPHNE machine with an upgraded detector.

c) 1987-2004 Study of high energy penetrating cosmic rays

The main effort in this field was carried out within the MACRO experiment, hosted in Hall B of the underground laboratories of Gran Sasso (INFN) and conducted by an Italy-US collaboration. The aims of this experiment were the study of the penetrating cosmic radiation, the search for neutrinos from stellar collapses inside our galaxy, and the possible detection of magnetic monopoles of cosmological origin.

The MACRO detector was optimized for the detection of magnetic monopoles. V.P. carried out the computation of the interaction probability (and the tracking efficiency) of the slow monopoles in the MACRO tracking system, providing an important contribution to the monopole flux limit determination.

Summary: 296 International Papers, 6188 Citations, 41 H index (Source Scopus)
V.P. gave 10 invited talks at international conference and 3 seminar in the last 5 years

Frascati 3 August 2018

Dr. Susanna Guiducci - Curriculum Vitae

1975: Degree in Physics with maximum grade (110/110 cum laude)
1977: Researcher at LNF-INFN, Frascati, Italy, 1988: First researcher
2009: Research Director at LNF
I am currently INFN team leader of ARIES (EU project 730871), a four years project on "Accelerator Research and Innovation for European Science and Society", which started in May 2017 [1].

I have been a staff scientist at LNF, since 1977, in the Accelerator Division, Accelerator Physics Group. I have been working on optics and beam physics for synchrotron light sources and electron positron colliders. I participated at several different Synchrotron Light Source projects as European Synchrotron Radiation Project for ESRF, Grenoble, France and Elettra SLS in Trieste, Italy. I had a leading role in the design commissioning and operation of the DAΦNE Φ-factory, the 0.5 GeV LNF electron-positron collider [2].

As a member of the International Collaboration TESLA, I coordinated the Damping Ring work for the TDR of the TESLA Superconducting Electron-Positron Linear Collider [3]

I was one of the worldwide selected members of the ILC Global Design Effort (GDE) from 2005 to 2012 [4]. Internally to the GDE, I had the responsibility of Accelerator System Leader for the two Damping Rings. I was the Group Leader of the International Linear Collider (ILC) Accelerator Activities at the Istituto Nazionale di Fisica Nucleare (INFN).
From 2003 to 2015 I represented LNF in the European Strategy Group for Accelerator R&D (ESGARD) [5]. ESGARD coordinated the preparation of many successful proposals for European projects on accelerators.
After 2nd july 2015 ESGARD has been replaced by meetings of the extended TIARA Collaboration Council [6]. From 2015 up to now I'm the deputy of the INFN member of the TIARA Collaboration Council.

In the past years I was the INFN scientific leader responsible for two large EU Projects dedicated to accelerator research and development: CARE (project N. RII3-CT-2003-506395) [7], from 2004 to 2008, and EuCARD (grant N. 227579) [8], from 2009 to 2013. For the Project EUROTEV "European Design Study Towards a Global TeV Linear Collider" (grant N. 011899, years 2005 – 2008) [9], I was both the INFN scientific leader and the coordinator of the WP3 Work package "Damping Rings". From 2013 to 2017 I was one of the Coordinators of the WP6 Work package "Low Emittance Rings" within the European Project EuCARD-2 "Enhanced European Coordination for Accelerator Research & Development" (grant N. 312453) [10].

From 2009 to 2013 I was responsible of the design of the injection system for the Italian SuperB Factory project [11] and for the Tau-charm Factory proposal [12].

From 2011 to 2017 I was a member of the European Physical Society Accelerator Group (EPS-AG) elected board.

I have presented several invited papers and talks and am author of more than hundred publications. I have taught at the CERN CAS accelerator school (Julich, Germany,1990) and at the ILC accelerator school (Sokendai, Japan, 2006 and Indore, India, 2012). I have served on numerous review committees and panels and as a chair at several conferences and workshops.

Links and references:

[1] ARIES https://aries.web.cern.ch/
[2] G. Vignola and DAΦNE Project team, "DAΦNE, The Frascati Φ-factory", pag. 1993, Proceedings of PAC'93, Washington,1993.
[3] TESLA TDR - DESY 2001-011.
[4] ILC TDR - ILC-REPORT-2013-040, June 2013
https://www.linearcollider.org/ILC/Publications/Technical-Design-Report
[5] ESGARD http://www.esgard.org/
[6] TIARAhttp://www.eu-tiara.eu/Phocea/Vie_des_labos/Seminaires/index.php?id=140
[7] CARE http://esgard.lal.in2p3.fr/Project/Activities/Current/
[8] EuCARD http://eucard-old.web.cern.ch/
[9] EUROTeV http://www.eurotev.org/
[10] EuCARD-2 eucard2.web.cern.ch
[11] M.E. Biagini, P. Raimondi, J. Seeman, "SuperB Progress Report: Accelerator", December 2010, arXiv: 1009.6178v3
[12] M.E. Biagini et al, "Tau/Charm Factory Accelerator Report", INFN Report INFN-13-13/LNF, September 2013, arXiv:1310.6944