

CURRICULUM VITAE

Paolo Emilio Strolin

Summary

I was born in Reggio Emilia (Italy) in 1939. I have a Laurea in Engineering (1963) and one in Physics (1968). In 1963, I had a Fellowship with the Solid State Physics Group of the Laboratorio Ricerche Elettroniche Olivetti, Milan. From 1964 till 1975 I was a CERN Staff Member as a Research Physicist, in the Accelerator and then in the Particle Physics Division. After about one year as a Scientific Associate with FOM-Netherlands, I had a tenured research position at ETH-Zurich, with a level corresponding to Associate Professor. From 1980 until 2010, I have been a Full Professor of Physics at the University of Naples Federico II. At present, I am a Professor Emeritus. Since my arrival in Naples, I am associated to INFN (*Istituto Nazionale di Fisica Nucleare*).

At the University and INFN of Naples, I have built up a group active in neutrino physics, as well as in multidisciplinary researches. In recent years, I have formed another group dedicated to muography, with applications to volcanoes and to archaeology. I have supervised more than 80 Laurea and PhD theses.

My research activities have covered accelerator physics, experimental particle physics and interdisciplinary research. They have produced about 170 publications on international scientific journals, as well as presentations at international conferences and lectures at national and international Schools on Particle Physics.

I have had several responsibilities in the management of Institutions and as a member or chairperson of Committees for the definition of scientific policies at the national and at the international level. I have promoted international cooperation.

I have always dedicated time and efforts to educational activities, at present carried out in the framework of the *Science and School* non-profit Association.

Scientific activity

I have built the neutrino group in Napoli starting with the *CHARM II* experiment (1983-94) at CERN on the study of the scattering of muon neutrinos and anti-neutrinos on electrons for a measurement of the electro-weak parameters from a purely leptonic process, as well as on the study of other neutrino induced processes such as precision measurement of the inverse muon decay, first observation of “leptonic trident” production by neutrinos and search for muon to electron neutrino oscillation. The experimental apparatus - more than 40 meter long - was basically consisting of calorimeter equipped with limited streamer tubes and having glass plates as a passive material, so optimized for electron detection. It was followed by a magnetic spectrometer.

I have been among the main proponents and the Spokesperson of the *CHORUS* experiment (1990-2007) at *CERN* for the search of “oscillation” of muon neutrinos to tau neutrinos, due to a non-zero neutrino mass in a range compatible with being a sizeable constituent of the Dark Matter in the Universe, as theoretically plausible at those times. The experiment has also produced results on the physics of particles with “charmed” quarks. *CHORUS* has been performed by a collaboration consisting of about 130 physicists from Europe and Japan. The experimental apparatus was consisting of nuclear emulsion as active neutrino target, combined with electronic

detectors to localize neutrino interactions in emulsion and to contribute to the event reconstruction.

I have been one of the three original proponents and the first Spokesperson of the *OPERA* experiment (1997 till now) in the long baseline neutrino beam from *CERN* to the *Gran Sasso National Laboratory* for the search of tau neutrino appearance in the low neutrino mass range indicated by the *Super-KamiokaNDE* experiment in Japan. The neutrino active target was a 1.3 kton Emulsion Cloud Chamber (ECC), a highly modular detector built up with - as basic units - “bricks” consisting of emulsion sheets and lead plates. The ECC is combined with electronic trackers and magnetic spectrometers, to localize neutrino interactions in emulsion and to contribute to the event reconstruction. The experiment was carried out by a collaboration of about 170 physicists from Europe and Japan. *OPERA* has produced the definite proof of muon to tau neutrino oscillation, by the direct observation of the appearance of tau neutrinos in the *CNGS* muon neutrino beam with more than 5σ statistical significance. The data analysis is being completed, also covering other aspects of neutrino physics.

With *CHORUS* and, above all, *OPERA* a nuclear emulsion laboratory has been set up in Naples. For the heavy scanning requirements of *OPERA*, a new generation of high-speed automated microscopes has been developed in Europe and Japan. The Napoli group contributed to the development of the so-called *European Scanning System* and is currently carrying out R&D on scanning systems with higher performance.

The expertise acquired in nuclear emulsion has led to interdisciplinary applications of the technique, in particular muography.

I have also been involved in the studies for experimentation at future facilities for neutrino physics by accelerators, such as Neutrino Factories.

In 2008, I have initiated the involvement in muography (conceptually similar to radiography, with muon instead of X-rays) of internal structures of volcanoes’ edifices, using muons naturally generated by interactions of cosmic rays in the Earth’s atmosphere. An electronic muon detector of a new generation was developed in the frame of the *MU-RAY* experiment. The detector is based on the use of plastic scintillator strips, wavelength-shifting fibres and Silicon photomultipliers. After tests at Mt. Vesuvius, at the Puy de Dôme a combined measurement with the Resistive Plate Chamber detector of the French *TOMUVOL* Collaboration has led to a better understanding of the background, which constitutes the most relevant limitation in volcano muography. *MU-RAY* has led to the *MURAVES* project for the very challenging muography of Mt. Vesuvius, jointly carried out by the Italian National Institutes for nuclear and particle physics (*INFN*) and for geophysics and volcanology (*INGV*). In addition, using the nuclear emulsion technique for muon detection a first image of the internal structure of the crater region of the Stromboli volcano was produced.

The electronic muon detector developed by *MU-RAY* is applicable to other fields, such as the study of geological structures, civil engineering and archaeology. The muography of underground structures in Mt. Echia, the site of the earliest settlement of the city of Naples, has shown that the capability of discovering unknown cavities by a detector that is suitable for a widespread utilisation.

In recent years, I have also participated in the initial phase of an innovative research program for a directional search of Dark Matter by the use of a new fine-grained nuclear emulsion (the so called nano-emulsion), capable of observing the direction of the nuclear recoils to achieve a substantial progress in background suppression.

Early scientific activities in particle and accelerator physics have mainly covered: studies for the design of the *CERN Super Proton Synchrotron (SPS)* and participation to the realization of the *Intersecting Storage Rings (ISR)* proton-proton collider at *CERN*; CP violation at the *CERN Proton Synchrotron (PS)*; proton-proton elastic scattering, inclusive inelastic diffraction $pp = pX$,

observation of double diffractive dissociation and evidence of double Pomeron exchange at the *ISR*; production of muon pairs with high invariant mass in an intense pion beam at *CERN*, for the study of the pion structure functions; production of the Y meson and of mesons with “open beauty” by pions; first studies for proton-antiproton physics at *CERN*; participation in the definition of the physics program at the *CERN Large Electron-Positron (LEP)* collider.

Responsibilities in the University and in Research Institutions

Director of the *Physics Department* of the *University of Napoli Federico II*.

Vice-President of the *Réseau Méditerranéen des Ecoles d'Ingénieurs (RMEI)*, which groups more than 100 technical and scientific universities in 16 countries around the Mediterranean Sea.

Chairman of the *Commissione Scientifica Nazionale II* of INFN for experiments in astroparticle physics, neutrino physics, searches for gravitational waves and in general non-accelerator particle physics. Director of the *Napoli Section of INFN*. Member of the *INFN Board of Directors*.

Member of the *Scientific Policy Committee (SPC)* of CERN, as well as of the following Scientific Committees: Intersecting Storage Rings physics (*ISRC*); Large Electron-Positron Collider physics (*LEPC*); fixed target and proton-antiproton collider physics with the Super Proton Synchrotron (*SPSLC*).

Member of the *European Committee for Future Accelerators (ECFA)*.

Educational activities

I have promoted interest in Science among students and the general public, through articles, publications and educational programs giving special attention to High Schools. In the framework of the *Istituto Italiano di Studi Filosofici* (Napoli), I have been organising seminars on modern physics. I have regularly delivered seminars in High Schools.

I have founded the *Science and School* non-profit Association [www.scienzaescuola.eu], of which I am the president. Various educational projects are being carried out, from the local to the international level and collaborating with scientific Institutions. *Science and School* aims at the dissemination of modern science and promotes the acquisition of international experiences by high school students. Various educational projects are being carried out, from the local to the international level and collaborating with various scientific Institutions. The *NEMO (Network Educational Museums Online)* project, carried out in collaboration with a network of schools, aims at the recovery of the remarkable heritage of historic scientific instruments still available in Neapolitan High Schools and at the creation of an overall virtual Museum. Educational materials have been produced and made available on the Web (www.scienzaescuola.eu/index.php/scienza-moderna/saggi-tematici).

I am in the Board of the Founder Members of the *Foundation IDIS - Città della Scienza* (Napoli). I have been a member of the Scientific Committee of the *Istituto Italiano Studi Filosofici*.

Organization of Conferences

I have been Chairman of the VIII International Conference on *Physics in Collision* (Capri, 1988), Director of the *CERN-JINR European School of High Energy Physics* (Sorrento-S.Agnello, 1994), Chairman of the XVI *International Workshop on Weak Interactions and Neutrinos* (Capri, 1997) and co-Director of the *Enrico Fermi International School on Neutrino Physics* (Varenna, 2002). In 1994-95 I have co-organised three *Napoli Thinkshops in Physics and Astrophysics*. The second *International Conference on Calorimetry in High Energy Physics* (Capri, 1991) was organised by my group.

I have organized the *MU-RAY International Workshop* (Napoli, 2008) and the *International Workshop on muon radiography of volcanoes* (Napoli, 2010). I have been one of the promoters of the series of International Workshops on *Muon and Neutrino Radiography (MNR)*, which has started in 2012. I have promoted international cooperation in the field of Earth Science studies by elementary particles, namely muons and neutrinos. I have co-organized the International Workshop *Muographers 2014* in Tokyo, where a cooperation agreement has been signed between *INFN* and the *Earthquake Research Institute (ERI)* of the University of Tokyo, followed by a similar agreement between *INGV* and *ERI*. I have contributed to the promotion and definition of the *ISAPP Summer Institute: using particle physics to understand and image the Earth* (Gran Sasso Science Institute, 2016).

I have been the main organiser of the *Mediterranean Workshop 2017*, held in Naples to promote cooperation among Mediterranean countries. The workshop has involved universities and research institutions of the Campania Region, together with Mediterranean Networks.

I have contributed to the organisation of other conferences in various roles, mainly as a member of Advisory Committees or Convenor.

SCIENTIFIC PUBLICATIONS

1. CERN Study Group on New Accelerators, *The design study of a 300 GeV Synchrotron*, CERN Report AR/SG/64-15, Vol. I and II (1964).

A design of the European 300 GeV Research facilities, CERN ECFA MC/60 (1970).

W. Hardt, P. Strolin, *8 GeV Booster Synchrotron with a FO_1FDO_2D type structure*, CERN AR /SG/65-5 (1965)

J. Bailey, H. Brechna, G. Petrucci, E. Picasso, P. Strolin, R.W. Williams, *Some remarks on possible improvements to the (g-2) experiment*, CERN NP 68-12 (1968)

Internal Reports on studies for the design of the CERN Intersecting Storage Rings (ISR)

2. P. Strolin, *Resonant extraction from the CERN ISR*, CERN 69-6 (1969).

P. Strolin, *Third-order resonance slow extraction from Alternating Gradient Synchotrons*, CERN ISR/TH/66-40 (1966)

P. Strolin, *Integer resonance slow extraction from Alternating Gradient Synchotrons*, CERN ISR/TH/66-41 (1966)

3. P. Strolin, E.J.N. Wilson, *The effect of momentum spread in slow extraction at an integer resonance. A theoretical study*, Proceedings of the 1969 Particle Accelerator Conference, Washington D.C. (1969), p. 255.

4. E. Keil, P. Strolin, AGS - *The ISR computer system for synchrotron design and orbit analysis*, CERN 69-5 (1969).

5. A.G. Ruggiero, P. Strolin, V.G. Vaccaro, *Effect of conducting plates on coherent space charge phenomena*, Proceedings of the VII Int. Conf. on High Energy Accelerators, Yerevan (1969), p. 175.

A.G. Ruggiero, P. Strolin, V.G. Vaccaro, *Instabilities of an intense coasting beam in the presence of conducting plates. A theoretical investigation*, CERN ISR-RF-TH/69-7 (1969).

P. Strolin, V.G. Vaccaro, *Beam-equipment interactions in the ISR: stability considerations*, CERN ISR-TH/69-28 (1969).

- K. Hübner, P. Strolin, V.G. Vaccaro, B. Zotter, *Concerning the stability of the ISR beams against coherent dipole oscillations*, CERN ISR-RF-TH/70-2 (1970).
- D. Möhl, P. Strolin, *Damping of transverse coherent oscillations by an electrode structure*, CERN ISR-TH/70-53 (1970)
6. E. Keil, W. Schnell, P. Strolin, *Feedback damping of horizontal beam transfer errors*, CERN 69-27 (1969).
 7. M. Strolin-Benedetti, P. Strolin, B. Glasson, *A computer program for metabolism studies*, Computer and Biomedical Research, 2 (1969) 461.
 8. J. Faure, A. Hilaire, P. Strolin, *Beam survival at resonant extraction*, Proceedings of the 1970 U.S.S.R. Accelerator Conference (1970), Vol. 2, p.215
 9. G. Burton, P.M. Hanney, B. de Raad, P. Strolin, *Methods to compute the optics of beam transfer channels*, Nuclear Instruments and Methods, 82 (1970) 259.
 10. M. Strolin-Benedetti, P. Strolin, *Analyse des méthodes de comptage d'échantillons doublement marqués par scintillation liquide: possibilités et limites*, Il Farmaco Ed. Scientifica, 25 (1970) 624.
 11. M. Holder, et al., *Determination of the p-p elastic cross section at 30 GeV centre of mass energy*, Physics Letters, B 35 (1971) 361.
 12. M. Holder et al., *Observation of small angle p-p elastic scattering at 30 GeV and 45 GeV centre of mass energies*, Physics Letters, B 35 (1971) 355.
 13. G. Barbiellini et al., *Observation of the geometry of colliding beams by means of beam-beam elastic collisions*, Proceedings of the VIII Int. Conf. on High Energy Accelerators, CERN (1971) 431.
 14. M. Holder et al., *Further results on small-angle elastic p-p scattering at very high energies*, Physics Letters, B 36 (1971) 400.
 15. G. Barbiellini et al., *Experimental observation of the angular distribution of charged particles around 90° in the centre of mass produced by p-p collisions at very high energies*, Physics Letters, B 39 (1972) 194.
 16. G. Barbiellini et al., *Small angle p-p elastic scattering at very high energies ($460 \text{ GeV}^2 < s < 2900 \text{ GeV}^2$)*, Physics Letters, B 39 (1972) 663.
 17. M. Holder et al., *On the decay $K_L \rightarrow \pi^0 \pi^0$* , Physics Letters, B 40 (1972) 141.
 18. G. Barbiellini et al., *Determination of the difference of phase between $\eta_{00} = A(K_L \rightarrow \pi^0 \pi^0)/A(K_S \rightarrow \pi^0 \pi^0)$ and $\eta_{+-} = A(K_L \rightarrow \pi^+ \pi^-)/A(K_S \rightarrow \pi^+ \pi^-)$* , Physics Letters, B 43 (1973) 529.
 19. P. Strolin, *Proton-proton elastic scattering at ISR energies in The Pomeron*, Proceedings of the VIII Rencontres de Moriond, Meribel-les-Allues (1973), p. 65.
 20. L. Baksay et al., *A proportional chamber with two-dimensional read-out using drift time and current division*, Proceedings of the 1973 Int. Conf. on Instrumentation for High Energy Physics, Frascati, p. 256.
 21. M. Strolin-Benedetti, P. Strolin, *The use of stable isotopes in metabolic studies*, Journal de Pharmacologie Clinique, 1 (1973) 15.

22. M. Strolin-Benedetti, P. Strolin, R. Roncucci, M.J. Simon, J. Lambelin, C. Nogent de Deuxchaisnes, *Evaluation of Alclofenac treatment regimes in man*, European Journal of Clinical Pharmacology, 6 (1974) 261.
23. A. Böhm et al., *Observation of a diffraction minimum in the p-p elastic scattering at ISR*, Physics Letters, B 49 (1974) 491.
24. A. Böhm et al., *Proton diffraction dissociation studies at CERN ISR*, Nuclear Physics, B 79 (1974) 1.
25. P. Strolin, M.G. Albrow, *The inclusive reaction $pp = pX$ at the CERN ISR*, in High Energy Hadronic Interactions, Proceedings of the IX Rencontres de Moriond, Meribel-les-Allues (1974), p. 237.
26. M. Strolin-Benedetti, P. Strolin, *Une méthode pour l'étude du régime d'équilibre lors d'administration répétées d'un médicament*, Journal de Pharmacologie Clinique I, 4 (1974) 219.
27. R. Webb et al., *Production of nucleon resonances by single diffraction dissociation at the CERN ISR*, Physics Letters, B 55 (1975) 331.
28. R. Webb et al., *Double diffraction dissociation and test of Pomeron factorisation at the CERN ISR*, Physics Letters, B 55 (1975) 336.
29. L. Baksay et al., *Observation of diffraction excitation in $p+p = (p \pi^+ \pi^-) + X$ at the CERN ISR and test of limiting fragmentation*, Physics Letters, B 53 (1975) 484.
30. L. Baksay et al., *Evidence for double diffraction excitation in $pp = (p \pi^+ \pi^-) + X$ at the ISR and test of factorisation*, Physics Letters, B 55 (1975) 491.
31. J.V. Jovanovich et al., *A search for slow massive particles with $Z < 2$ at the CERN ISR*, Physics Letters, B 56 (1975) 105.
32. P. Strolin, *Diffraction production of the $p \pi^+ \pi^-$ system at the ISR*, in Phenomenology of hadronic structure, Proceedings of the X Rencontres de Moriond, Meribel les Allues (1975), p. 47.
33. L. Bertocchi, G. Cohen-Tannoudji, A. Krzywicki, A. Morel, P. Strolin, *Les phénomènes diffractifs*, Volume issued by Ecole d'été de Physique des Particules, Gif-sur-Yvette (1975).
34. M. Strolin-Benedetti, S. Perczel, P. Strolin, A. Assandri, J. Quaglia, D.A. Larue, *A new method for the determination of ^{15}N and ^{13}C for excretion balance studies of foreign compounds*, Proceedings of the 2nd Int. Conf. on Stable Isotopes, Argonne (1975) 551.
35. P. Strolin, *New ISR results on diffraction physics*, Proceedings of the IV Int. Seminar on High Energy Physics, Dubna (1975) 203.
36. L. Baksay et al., *Evidence for double Pomeron exchange at the CERN ISR*, Physics Letters, B 61 (1976) 89.
37. L. Baksay et al., *Diffraction dissociation in the reaction $pp = A K^+ + p$ at the CERN ISR*, Physics Letters, B 61 (1976) 405.
38. M.G. Albrow et al., *Correlations associated with particles produced at small angles in pp collisions at the CERN ISR*, Nuclear Physics, B 102 (1976) 275.
39. M. Strolin-Benedetti, D. Gutty and P. Strolin, *A comparative study of the effect of oral contraceptives and cigarette smoking on platelet adhesiveness*, Hemostasis, 5 (1976) 14.
40. L. Baksay et al., *Multiwire proportional chamber spectrometer for the CERN ISR*, Nuclear Instruments and Methods, 133 (1976) 219.

41. M.G. Albrow et al., *A search for narrow resonances in p-p collisions at 53 GeV centre of mass energy*, Nuclear Physics, B 114 (1976) 365.
42. M.G. Albrow et al., *Correlations between two identified charged hadrons at the CERN ISR*, Physics Letters, B 65 (1976) 295.
43. G.C. Mantovani et al., *First results on diffractive dissociation of neutrons at the ISR*, Physics Letters, B 64 (1976) 471.
44. D. Möhl, L. Thorndahl, P. Strolin, G.I. Budker, N. Dikanski, A.N. Skrinsky, *Possibilities for antiproton beams at CERN using cooling by electrons*, CERN EP Report 76-03 (1976).
45. D. Möhl, L. Thorndahl, P. Strolin, *Stochastic cooling of antiprotons for ISR physics*, CERN EP Report 76-05 (1976).
46. P. Strolin, *Physics with anti-protons, deuterons and light ions at the ISR*, Workshop on future ISR physics, First Session, CERN (1976), CERN/ISRC/76-32, p. 31.
- L. Bertocchi, J. Ellis, G. Flügge, G. Goggi, K. Hübner, M. Jacob, D. Möhl, P. Strolin, *Physics with antiprotons, deuterons and light ions at the ISR*, Workshop on future ISR physics, First Session, CERN (1976), Study Group Report CERN ISR-Workshop/76-F-1.
47. P. Strolin, *Proton-antiproton interactions at ISR energies*, Workshop on future ISR physics, Second Session, CERN (1977), CERN ISR-Workshop/2-16.
- P. Strolin, A. Donnachie, K. Hübner, G. Matthiae, P. Braccini, K. Hansen, F. Vannucci, U. Gastaldi, *Proton-antiproton at the ISR*, Workshop on future ISR physics, Second Session, CERN (1977), CERN ISR-Workshop/2-9.
48. P. Strolin, *Light ions at CERN energies*, Proceedings of the Topical Meeting on Multiparticle Production on Nuclei at Very High Energies, Trieste (1976), p. 575.
49. L. Baksay et al., *Measurements of the pp total cross section and small angle elastic scattering at the ISR energies*, Nuclear Physics, B 141 (1978) 1.
50. A.G. Clark et al., *Electron pair production at the CERN ISR*, Nuclear Physics, B 142 (1978) 29.
51. A.G. Clark et al., *Large transverse momentum π^0 production in pp, pd and dd collisions at the CERN ISR*, Nuclear Physics, B 142 (1978) 189.
52. A.G. Clark et al., *Inclusive π^0 production from high-energy pp collisions at very large transverse momenta*, Physics Letters, B 74 (1978) 267.
53. A.G. Clark et al., *Muon-electron events in high energy pp collisions*, Physics Letters, B 77 (1978) 339.
54. J. Allaby, G. Barbiellini, H. Hoffmann, V. Hungerbühler, P.G. Innocenti, D. Linglin, I. Peruzzi, M. Piccolo, M. Placidi, K. Potter, B. Richter, P. Strolin, *Design of LEP interaction regions*, presented by P.S. as Working Group Convenor, Proceedings of the LEP Summer Study, Les Houches and CERN (1978), CERN 79-01, p. 243.
- P. Strolin, K. Potter, *Interface between machine and experiments*, Proceedings of the ECFA-LEP Working Group Meeting, Rome 1979.
55. A. Chilingarov et al., *Production of high transverse momentum low mass electron-positron pairs in high energy pp collisions*, Nuclear Physics, B 151 (1979) 29.
56. J.C.M. Armitage et al., *A study of the reaction $p+p = p+p + X$ at ISR energies*, Physics Letters, B 82 (1979) 149.

57. S. Erhan et al., *Lambda⁰ polarization in p-p interactions at $\sqrt{s} = 53$ and 62 GeV*, Physics Letters, B 82 (1979) 301.
58. A. Chilingarov et al., *On the production of charmed mesons in high-energy pp collisions*, Physics Letters, B 83 (1979) 136.
59. S. Falciano et al., *A-dependence of muon pair production in π^- - nucleus interactions at 280 GeV/c*, Physics Letters, B 104 (1981) 416-420.
60. P. Perez et al., *Measurement of single electron production up to 4.5 GeV/c transverse momentum at the CERN ISR*, Physics Letters, B 112 (1982) 260-264.
61. L. Anderson et al., *A high-resolution spectrometer for the study of high-mass muon pairs produced by intense hadron beams*, Nuclear Instruments and Methods, 223 (1984) 26-29.
62. B. Betev et al., *Differential cross-section of high-mass muon pairs produced by a 194 GeV/c π^- beam on a Tungsten target*, Zeitschrift für Physik, C 28 (1985) 9-14.
63. B. Betev et al., *Observation of anomalous scaling violation in muon pair production by 194 GeV/c π^- - Tungsten interactions*, Zeitschrift für Physik, C28 (1985) 15-22.
64. A. Ereditato et al., *Upper limits for $B\bar{B}$ production in π^- - Tungsten interactions at 194 GeV/c*, Physics Letters, B 157 (1985) 463-468.
65. S. Falciano et al., *Production of Y by 194 GeV/c negative pions on Tungsten*, Physics Letters, B 157 (1985) 92-96.
66. S. Falciano et al., *Angular distributions of muon pairs produced by 194 GeV/c negative pions*, Zeitschrift für Physik, C 31 (1986) 513-526.
67. M. Caria et al., *The test system of the digital electronics for the CHARM II limited streamer tubes*, Nuclear Instruments and Methods, A241 (1985) 100-106.
68. J.P. De Wulf et al., *Test results of the streamer-tube system of the CHARM II neutrino detector*, Nuclear Instruments and Methods, A 252 (1986) 443-449.
69. M. Grossmann-Handschin et al., *A high-statistics study of Y -meson production in $\pi^- W$ reactions at 286 GeV/c*, B 179 (1986) 170.
70. P. Bordalo et al., *Nuclear effects on the nucleon structure functions in hadronic high-mass dimuon production*, Physics Letters, B 193 (1987) 368.
71. P. Bordalo et al., *Observation of a nuclear dependence of the transverse momentum distribution of massive muon pairs produced in hadronic collisions*, Physics Letters, B 193 (1987) 373.
72. M. Caria et al., *Large-series test of limited streamer tubes*, Nuclear Instruments and Methods, A 260 (1987) 368.
- G. Battistoni et al., *Plastic streamer tube hadron calorimeter*, Proceedings of the Gas Calorimeter Workshop, Fermilab, Oct. 1982, p. 106.
73. J.P. De Wulf et al., *Test results and conditioning procedure of a limited streamer-tube calorimeter*, Nuclear Instruments and Methods, A 263 (1988) 109.
- G. Bertrand-Coremans et al., *The streamer tube system of the CHARM II neutrino detector*, Proceedings of the Gas Sampling Calorimetry Workshop, Fermilab, Oct. 1985.
74. M. Guanziroli et al., *Angular distributions of muon pairs produced by negative pions on deuterium and tungsten*, Zeitschrift für Physik, C 37 (1988) 545.

75. P. Bordalo et al., *Open beauty production in high-energy π^- - Tungsten interactions*, Zeitschrift für Physik, C 39 (1988) 7.
76. K. De Winter et al., *Experimental results obtained from a low-Z, fine-grained electromagnetic calorimeter*, Nuclear Instruments and Methods, A 277 (1989) 83.
77. K. De Winter et al., *An electron-hadron separator for digital sampling calorimeters*, Nuclear Instruments and Methods, A 277 (1989) 170.
78. K. De Winter et al., *A detector for the study of neutrino-electron scattering*, Nuclear Instruments and Methods, A 278 (1989) 670.
79. D. Geiregat et al., *A new determination of the electroweak mixing angle from muon-neutrino electron scattering*, Physics Letters, B 232 (1989) 539.
80. D. Geiregat et al., *First Observation of Neutrino Trident Production*, Physics Letters, B 245 (1990) 271.
81. D. Geiregat et al., *A new measurement of the cross-section of the inverse muon decay reaction $\nu_\mu + e^- = \mu^- + \nu_e$* , Physics Letters, B 247 (1990) 131.
82. D. Geiregat et al., *An improved determination of the electroweak mixing angle from muon-neutrino electron scattering*, Physics Letters, B 259 (1991) 499.
83. P. Vilain et al., *Neutral Current Coupling Constants from Neutrino- and Antineutrino-Electron Scattering*, Physics Letters, B 281 (1992) 159.
84. D. Geiregat et al., *Calibration and performance of the CHARM II detector*, Nuclear Instruments and Methods, A 325 (1993) 92.
85. P. Vilain et al., *Measurement of Differential Cross Sections for Muon-Neutrino Electron Scattering*, Physics Letters, B 302 (1993) 351.
86. M. Gruwé et al., *Search for ν_μ - ν_τ oscillation*, Physics Letters, B 309 (1993) 463.
87. P. Vilain et al., *Coherent Single Charged Pion Production by Neutrinos*, Physics Letters, B 313 (1993) 267.
88. P. Vilain et al., *Flavour Universality of Neutrino Coupling with the Z*, Physics Letters, B 320 (1994) 203.
89. P. Vilain et al., *Constraints on additional Z bosons derived from neutrino-electron scattering measurements*, Physics Letters, B 333 (1994) 465.
90. S. Buontempo et al., *An instrument for the high-statistics measurement of plastic scintillating fibers*, Nuclear Instruments and Methods, A 348 (1994) 131.
91. S. Buontempo et al., *Construction and test of calorimeter modules for the CHORUS experiment*, Nuclear Instruments and Methods, A 349 (1994) 70.
92. P. Vilain et al., *Precision measurement of electroweak parameters from the scattering of muon neutrinos on electrons*, Physics Letters, B 335 (1994) 246.
93. P. Vilain et al., *Search for muon to electron neutrino oscillations*, Zeitschrift für Physik, C 64 (1994) 539.
94. P. Vilain et al., *Experimental study of electromagnetic properties of the muon neutrino in neutrino-electron scattering*, Physics Letters, B 345 (1995) 115.
95. P. Vilain et al., *Search for heavy isosinglet neutrinos*, Physics Letters, B 343 (1995) 453.

96. P. Vilain et al., *A precise measurement of the cross section of the inverse muon decay $\nu_{\mu} + e^{-} = \mu^{-} + \nu_e$* , Physics Letters, B 364 (1995) 121.
97. E. Di Capua et al., *Response to electrons and pions of the calorimeter for the CHORUS experiment*, Nuclear Instruments and Methods, A378 (1996) 221.
98. A. Ereditato, P. Strolin e G. Romano, *Study of a new experiment for the search of $\nu_{\mu}\nu_{\tau}$ oscillations*, Nuclear Physics (Proc. Suppl.), B 54 (1997) 139.
99. E. Eskut et al., *The CHORUS experiment to search for $\nu_{\mu}\nu_{\tau}$ oscillation*, Nuclear Instruments and Methods, A 401 (1997) 7-44.
100. A. Ereditato, K. Niwa, P. Strolin, *OPERA: an emulsion detector for a long baseline neutrino oscillation search*, Nuclear Physics (Proc. Suppl.), B 66 (1998) 423.
- A. Ereditato, K. Niwa, P. Strolin, *The emulsion technique for short, medium and long baseline $\nu_{\mu}\nu_{\tau}$ oscillation experiments*, INFN/AE-97/06 and DAPNU-97-07 (1997).
101. E. Eskut et al., *A search for $\nu_{\mu}\nu_{\tau}$ oscillation*, Physics Letters, B 424 (1998) 202-212
102. E. Eskut et al., *Search for $\nu_{\mu}\nu_{\tau}$ oscillation using the τ decay modes into a single charged particle*, Physics Letters, B 434 (1998) 205-213.
103. P. Annis et al., *Observation of neutrino induced diffractive D_s^{*+} production and subsequent decay $D_s^{*+} \rightarrow D_s^{+} \rightarrow \tau^{+} \rightarrow \mu^{+}$* , Physics Letters, B 435 (1998) 458-464
104. B. Akkus et al., *Experimental search for muonic photons*, Physics Letters, B 434 (1998) 200
105. P. Vilain et al., *Leading-order QCD analysis of neutrino-induced dimuon events*, European Physics Journal C 11 (1999) 19
106. P. Migliozzi, P. Strolin, *Considerations on $\nu_{\mu}\nu_{\tau}$ appearance experiments using emulsion techniques*, Proceedings of the Workshop on Neutrino Factories based on Muon Storage Rings, Lyon (1999), Nuclear Instruments and Methods A 451 (2000) 167
- A. Blondel et al., *The neutrino factory: beam and experiments*, Nuclear Instruments and Methods A 451 (2000) 102
107. A.G. Cocco and P. Strolin, *Appearance experiments to search for $\nu_{\mu}\nu_{\tau}$ oscillations*, Invited talk, Proceedings of the Symposium on Neutrino Mixing in honour of S. Bilenky, Torino (1999) p.71
108. E. Eskut et al., *New results from a search for $\nu_{\mu}\nu_{\tau}$ and $\nu_e\nu_{\tau}$ oscillation*, Physics Letters, B 497 (2001) 8-22
109. E. Eskut et al., *Observation of weak neutral current neutrino production of J/ψ* , Physics Letters B 503 (2001) 1-9
110. A. Kayis-Topaksu et al., *Measurement of D^0 production in neutrino charged-current interactions*, Physics Letters B 527 (2002) 173-181
111. A. Kayis-Topaksu et al., *Observation of one event with the characteristics of associated charm production in neutrino charged-current interactions*, Physics Letters B539 (2002) 188-196
112. A. Kayis-Topaksu et al., *Determination of the semi-leptonic branching fraction of charm hadrons produced in neutrino charged-current interactions*, Physics Letters B 549 (2002) 48-57

113. A. Kayis-Topaksu et al., *Measurement of Λ_c^+ production in neutrino charged current interactions*, Physics Letters B 555 (2003) 156-166
114. A. Kayis-Topaksu et al., *Measurement of the Z/A dependence of neutrino charged-current total cross-sections*, Europhysics Journal C 30 (2003) 159-167
115. A. Kayis-Topaksu et al., *Cross-section measurement for quasi-elastic production of charmed baryons in neutrino nucleus interactions*, Physics Letters B 575 (2003) 198-207
116. G. De Lellis, P. Migliozi and P. Strolin, *Heavy quark studies with nuclear emulsions*, in *Roberto Salmeron Festschrift*, Edited by R. Aldrovandi, J.M. Gago and A. Santoro, Aiafax Publ. Company, Rio de Janeiro (2003), p. 81-96
117. A. Kayis-Topaksu et al., *Experimental study of trimuon events in neutrino charged-current interactions*, Physics Letters B 596 (2004) 44-53.
118. G. Önengüt et al., *Measurement of charm production in antineutrino charged-current interactions*, Physics Letters B 604 (2004) 11-21
119. G. Önengüt et al., *Measurement of fragmentation properties of charmed particle production in charged-current neutrino interactions*, Physics Letters B 604 (2004) 145-156
120. P. Strolin, *Neutrino detectors for Super-Beams, β -beams and ν -Factories*, Proc. of the 6-th Int. Workshop on ν -Factories and Super-Beams (NUFACT04), Osaka (Japan), July 26 – Aug. 1 2004, Nuclear Instruments and Methods (Proc. Suppl.) B149 (2005) 60-66
121. G. Önengüt et al., *Measurements of D-zero production and branching fractions in neutrino nucleon scattering*, Physics Letters B 613 (2005) 105-117
122. G. Önengüt et al., *Measurement of D-star production in neutrino interactions*, Physics Letters B 614 (2005) 155-164
123. G. Önengüt et al., *Search for Superfragments and Measurement of the Production of Hyperfragments in Neutrino-Nucleus Interactions*, Nuclear Physics B 718 (2005) 35-54
124. A. Kayis-Topaksu et al., *Measurement of topological branching ratios of charmed hadrons produced in neutrino-induced charged-current interactions*, Physics Letters B 626 (2005) 24-34.
125. N. Armenise et al., *High-speed particle tracking in nuclear emulsion by last-generation automatic microscopes*, Nuclear Instruments and Methods A 551 (2005) 261-270
126. G. Onengüt et al., *Measurement of nucleon structure functions in neutrino scattering*, Physics Letters B 632 (2006) 65-75
127. M. De Serio et al., *High precision measurements with nuclear emulsions using fast automated microscopes*, Nuclear Instruments and Methods A554 (2005) 247-254
128. P. Strolin, *Research and development on detectors: status and priorities*, Proc. of the 7-th Int. Workshop on ν -Factories and Super-Beams (NUFACT05), Frascati (Italy), July 21-26 2005, Nuclear Instruments and Methods (Proc. Suppl.) B155 (2006) 148-152
129. L. Arrabito et al., *Hardware performance of a scanning system for high speed analysis of nuclear emulsions*, Nuclear Instruments and Methods A568 (2006) 578-587
130. P.Strolin, A.Blondel, A.Cervera-Villanueva, A.Donini, P.Huber, M.Mezzetto, *Future neutrino oscillation facilities*, Acta Phys. Polon. B37 (2006) 2077-2113; hep-ph/0606111
131. R. Acquafredda et al., *First events from the CNGS neutrino beam detected in the OPERA experiment*, New Journal of Physics 8 (2006) 303-316, hep-ex/0611023
132. L. Arrabito et al., *Electron/pion separation with an Emulsion Cloud Chamber by using a Neural Network*, Journal of Instrumentation JINST 2 P02001 (2007)

133. L. Arrabito et al., *Track reconstruction in the emulsion-lead target of the OPERA experiment using the ESS microscope*, Journal of Instrumentation JINST 2 P05004 (2007)
134. G. De Lellis et al., *Emulsion Cloud Chamber technique to measure the fragmentation of a high-energy carbon beam*, Journal of Instrumentation JINST 2 (2007) P06004.
135. A. Kayis-Topaksu et al., *Charged particles multiplicities in charged-current neutrino- and anti-neutrino-nucleus interactions*, arXiv:0707.1586, European Physical Journal C 51 (2007), 775-785
136. A. Kayis-Topaksu et al., *Measurement of associated charm production in neutral- and charged-current neutrino interactions*, arXiv:0708.2820, European Physical Journal C 52 (2007) 543-552.
137. E. Eskut et al., *Final results from a search for $\nu\text{-}\mu$ to $\nu\text{-}\tau$ oscillations with the CHORUS experiment*, arXiv:0710.3361, Nuclear Physics B 793 1-2 (2008) 326-343
138. A. Kayis-Topaksu et al., *Leading order analysis of neutrino induced dimuon events in the CHORUS experiment*, Nuclear Physics B 798 (2008) 1-16.
139. A. Anokhina et al., *Study of the effects induced by lead on the emulsion films of the OPERA experiment*, Journal of Instrumentation JINST 3 P07002 (2008).
140. A. Ariga et al., *Emulsion sheet doublets as interface trackers for the OPERA experiment*, Journal of Instrumentation JINST 3 P07005 (2008).
141. P. Strolin, *The OPERA neutrino oscillation experiment*, Proceedings of the 3rd Workshop on Nuclear Emulsion Techniques, Jan. 24-25 2008, Nagoya, Japan, Journal of the Society of Photographic Science and Technology of Japan, Special Issue 71 (4) (2008) 239-244.
142. N. Agafonova et al., *The detection of neutrino interactions in the emulsion/lead target of the OPERA experiment*, arXiv:0903.2973, Journal of Instrumentation 2009_JINST_4_P06020 (2009)
143. R. Acquafredda et al., *The OPERA experiment in the CERN to Gran Sasso neutrino beam*, Journal of Instrumentation JINST 4 P04018 (2009)
144. E. Borriello et al., *Sensitivity on Earth core and mantle densities using Atmospheric Neutrinos*, arXiv:0904.0796, Journal of Cosmology and Astroparticle Physics (2009) 030
145. S. Buontempo et al. (presented by P. Strolin), *Perspectives for the radiography of Mt. Vesuvius by cosmic ray muons*, Proceedings of the International Workshop on High Energy Earth Science, June 26-27 2008, Tokyo (Japan), Earth Planets Space 62 (2010) 131-137.
146. F. Beauducel et al., *The MU-RAY project: Summary of the round-table discussions*, Proceedings of the MU-RAY Workshop, September 11-12 2008, Napoli (Italy), Earth Planets Space 62 (2010) 145-151.
147. E. Borriello et al., *Simulations of neutrino interactions in matter for geological structures radiography*, Proceedings of the MU-RAY Workshop, September 11-12 2008, Napoli (Italy), Earth Planets Space 62 (2010) 187-193.
148. E. Borriello et al., *High energy neutrinos to see inside the Earth*, Proceedings of the International Workshop on High Energy Earth Science, June 26-27 2008, Tokyo (Japan), Earth Planets Space 62 (2010) 205-209.
149. E. Borriello et al., *Studies on neutrino Earth radiography*, Proceedings of the MU-RAY Workshop, September 11-12 2008, Napoli (Italy), Earth Planets Space 62 (2010) 211-214.
150. N. Agafonova et al., *Measurement of the atmospheric muon charge ratio with the OPERA detector*, arXiv:1003.1907, European Physical Journal C 67 (2010) 25-37
151. N. Agafonova et al., *Observation of a first $\nu\tau$ candidate event in the OPERA experiment in the CNGS beam*, arXiv:1006.1623, Physics Letters B 691 (2010) 138-145

152. S. Aoki et al., *Measurement of low-energy neutrino cross-sections with the PEANUT experiment*, New Journal of Physics 12 (2010) 113028
153. G. De Lellis et al., *Measurement of the fragmentation of Carbon nuclei used in hadron-therapy*, Nuclear Physics A 853 (2011) 124-134
154. N. Agafonova et al., *Study of neutrino interactions with the electronic detectors of the OPERA experiment*, arXiv: 1102.1882, New Journal of Physics 13 (2011) 053051
155. A Kayis-Topaksu et al., *Measurement of charm production in neutrino charged-current interactions*, arXiv: 1107.0613v1, New Journal of Physics 13 (2011) 093002
156. G. Ambrosi et al., *The MU-RAY project: Volcano radiography with cosmic-ray muons*, Nucl. Instr. and Meth. A 628 (2011) 120-123
157. N. Agafonova et al., *Momentum measurement by the Multiple Coulomb Scattering method in the OPERA lead emulsion target*, arXiv: 1106.6211, New Journal of Physics 14 (2012) 013026
158. N. Agafonova et al., *Search for $\nu_\mu - \nu_\tau$ oscillation with the OPERA experiment in the CNGS beam*, arXiv:1107.2594, New Journal of Physics 14 (2012) 0033017
159. A. Anastasio et al., *The MU-RAY experiment. An application of SiPM technology to the understanding of volcanic phenomena*, Nucl. Instr. and Methods A718 (2013) 134–137
160. N. Agafonova et al., *Search for $\nu_\mu - \nu_e$ oscillation with the OPERA experiment in the CNGS beam*, arXiv:1303.3953, Journal of High Energy Physics (2013) 2013:4
161. P. Strolin, *Volcanoes and muons*, Neutrino Oscillation Workshop, Otranto, Sept. 9-16, 2012; Nuclear Physics B Proc. Suppl. 237-238 (2013) 374-380
162. N. Agafonova et al., *New results on $\nu_\mu - \nu_\tau$ appearance with the OPERA experiment in the CNGS beam*, arXiv:1308.2553, Journal of High Energy Physics (2013) 2013:36
163. A. Anastasio et al., *The MU-RAY detector for muon radiography of volcanoes*, Nucl. Instr. and Methods A732 (2013) 423–426
164. N. Agafonova et al., *Evidence for $\nu_\mu - \nu_\tau$ appearance in the CNGS beam with the OPERA experiment*, arXiv:1401.2079, Physical Review D 89 (2014) 051102(R)
165. N. Agafonova et al., *Measurement of TeV atmospheric muon charge ratio with the full OPERA data*, arXiv:1403.0244, European Physical Journal C 74 (2014) 2933
166. N. Agafonova et al., *Observation of $\nu_\mu - \nu_\tau$ appearance in the CNGS beam with the OPERA experiment*, arXiv:1407.3513, Progr. Theor. Exp. Physics (2014) 101C01
167. N. Agafonova et al., *Procedure for short-lived particle detection in the OPERA experiment and its application to charm decays*, arXiv:1404.4537, European Physical Journal C 74 (2014) 2986
168. N. Agafonova et al., *Limits on muon-neutrino to tau-neutrino oscillations induced by a sterile neutrino state obtained by OPERA at the CNGS beam*, arXiv:1803.1876, Journal of High Energy Physics, 2015.69 (2015)
169. F. Ambrosino et al., *Joint measurement of the atmospheric muon flux through the Puy de Dôme volcano with plastic scintillators and Resistive Plate Chambers detectors*, Journal of Geophysical Research Solid Earth, 120 (2015), doi: 10.1002/2015JB011969
170. N. Agafonova et al., *Discovery of $\nu_\mu - \nu_\tau$ appearance in the CNGS neutrino beam with the OPERA experiment*, arXiv:1507.01417, Physical Review Letters, 115, 121802 (2015)

171. A. Alexandrov et al., *Intrinsic neutron background of nuclear emulsions for directional Dark Matter searches*, arXiv:1507.03532, *Astroparticle Physics* 80 (2015) 16-21
172. N. Agafonova et al., *Determination of the muon charge sign with the dipolar spectrometers of the OPERA experiment*, *Journal of Instrumentation* 2016_JINST_11_P07022 (2016)
173. G. Saracino et. al., *Imaging of underground cavities with cosmic-ray muons from observations at Mt. Echia (Naples)*, *Nature Scientific Reports* 7, Article number: 1181 (2017), doi:10.1038/s41598-017-01277-3.
174. N. Agafonova et al., *Study of charged hadron multiplicities in charged-current neutrino-lead interactions in the OPERA detector*, arXiv:1706.07930, *European Physical Journal C* (2018) 78:62, doi:10.1140/epjc/s10052-017-5509-y.
175. N. Agafonova et al., *Final results of the search for ν_μ - ν_e oscillations with the OPERA detector in the CNGS beam*, arxiv.org/abs/1803.11400, *Journal of High Energy Physics* (2018) 2018: 151. [https://doi.org/10.1007/JHEP06\(2018\)151](https://doi.org/10.1007/JHEP06(2018)151)
176. N. Agafonova et al., *Final results of the OPERA experiment on ν_τ appearance in the CNGS beam*, arxiv.org/pdf/1804.04912.pdf, *Physical Review Letters*. 120, 211801 (2018).
177. N. Agafonova et al., *Discovery potential for directional Dark Matter detection with nuclear emulsions*, *European Physical Journal C* 78 (2018) 578. DOI: 10.1140/epjc/s10052-018-6060-1
178. L. Cimmino et al., *3D Muography for the Search of Hidden Cavities*, *Nature Scientific Reports* 9, Article number: 2974 (2019), doi:10.1038/s41598-019-39682-5.
179. N. Agafonova et al., *Measurement of the cosmic ray muon flux seasonal variation with the OPERA detector*, arXiv:1810.10783, submitted to *JCAP* (2018).

The above list gives the papers published in international journals and a selection of personal presentations to conferences and of other publications of special relevance.