**Curriculum studiorum of Paolo Silvestrini**

Paolo Silvestrini was born in Pisa in 1960. He graduated in Physics in 1984 at the University of Naples "Federico II" with 110/110 cum laude, performing a thesis on superconducting solid-state devices based on the Josephson effect: supervisor prof. Antonio Barone.

In 1985 and 1986 he worked at the Argonne National Laboratory Argonne-Illinois-USA on a project he proposed for the study of the different dissipation regimes in Josephson junctions. This study proved to be of great importance for the possibility of observing macroscopic quantum effects in Josephson systems, with a concrete possibility of realizing quantum bits based on these devices.

From 1986 until 2001 he worked at the Institute of Cybernetics of the CNR carrying out research in the field of Structure of Matter, directing a research group that dealt with phenomena of Fundamental Physics, such as macroscopic quantum tunnel and macroscopic quantum coherence. Some of his pioneering works demonstrated the presence of a quantized energy level in Josephson systems, opening the possibility of realizing the first quantum bits based on superconducting junctions.

From 1 November 2001 he is full professor of Physics at the University of Campania Luigi Vanvitelli.

His research activity is mainly carried out in the field of Experimental Physics in Structure of Matter at Low Temperatures, on solid state devices of the Josephson type and SQUIDs, in particular in the field of macroscopic quantum coherence and quantum computation.

He currently coordinates a scientific collaboration between his University and the ISASI Institute of the National Research Council, of which he is an associate researcher.

In addition to research activities on quantum information and quantum computation, Paolo Silvestrini is responsible for the following research activities:

Superconducting quantum interference devices and related applications.
The research activity concerns the development of superconducting quantum interference devices (SQUIDs) and advanced instrumentation for biomedicine. In particular SQUIDs devices are designed and built and prototype instrumentation is developed based on such devices in interdisciplinary projects for uses in biomedicine, nanomagnetism, geophysics, magnetic microscopy, and fundamental physics experiments. The development of SQUID devices and their applications can significantly contribute to the development of components, innovative instrumentation and the implementation of advanced diagnostic systems. In this context, a multichannel SQUID system (165 channels) for magnetoencephalography (MEG) developed by CNR-ISASI is operating at the Hermitage diagnosis and treatment clinic (Capodimonte, Naples). MEG is a totally non-invasive advanced diagnostic technique that

measures the weak magnetic signals generated by neuronal currents and analyzes the data with advanced mathematical models.

Carbon nanotube sensors.
In this context, starting from the basic properties of carbon nano tubes, the research aims to the realization of a sensor with photo-response properties that are interesting in a high range of frequencies starting from ultraviolet. This sensor has many application possibilities that range from research in the field of dark matter, to the realization of advanced telescopes envisaged in the international project CTA (Cherencov thelescope array).

A paradigm of Quantum Physics applied to management aspects related to scientific innovation.
The activity concerns the theoretical understanding and the determination of the socio-economic parameters relevant to the diffusion of technological innovation. This can be important in deciding the strategic actions to be taken in the presence of an emerging technology. A mathematical approach based on a "master equation" similar to that used to describe quantum transitions is proposed. The model is able to describe the temporal evolution of the development of a new technology in conditions that can be associated to the various market parameters and to the potential socio-economic impact of scientific innovation.

Paolo Silvestrini is the author of over 100 papers published in international journals, and of various patents in the field of Structure of Matter.

He has been several times chairman of the Organizing Committee of various international workshops in the areas of macroscopic quantum coherence, nanometric solid-state devices, and quantum computation.

He is the author of several monographs, one in collaboration with Anthony Leggett, 2003 Nobel Prize in Physics, entitled "Quantum Computing and Quantum Bits in Mesoscopic Systems" published by Kluwer Academic / Plenum Publishers, USA in 2004.

**General Chairman of Internazional workshop:**

12-16 June 2006:
"V Workshop on Macroscopic Quantum Coherence and Coherence-MQC$^2$ and nanotechnologies"
Chairmen: J.Clarke, A.J. Leggett, P. Silvestrini .

7-10 June 2004:
"IV Workshop on Macroscopic Quantum Coherence and Coherence-MQC$^2$",
Steering Committee: P. Delsing, C. Granata, Yu. Pashkin, and B. Ruggiero
Chairman: P. Silvestrini

3-7 June 2002:
"III Workshop on Macroscopic Quantum Coherence and Coherence-MQC$^2$"

Steering Committee: A. J. Leggett, B. Ruggiero, and P. Silvestrini.
Chairman: P. Silvestrini

28 May-1 June 2001:
"Superconducting Nano-Electronics Devices-SNED"
Steering Committee: J. Pekola, B. Ruggiero, and P. Silvestrini.
Chairman: J. Pekola and P. Silvestrini

14-17 June 2000:
"II Workshop on Macroscopic Quantum Coherence and Coherence-MQC$^2$"
Steering Committee: D.V. Averin, B. Ruggiero, and P. Silvestrini.
Chairman: P. Silvestrini.

10-13 June 1998:
"I Workshop on Macroscopic Quantum Tunneling and Coherence-MQTC"
Steering Committee: P. Silvestrini, B. Ruggiero, F. Petruccione, and A.Barone.
Chairmen: P. Silvestrini and A. Barone.

**Books**

Quantum computing and quantum bits in mesoscopic systems
AJ Leggett, B Ruggiero, P Silvestrini
Kluwer Academic/Plenum Publishers NY( 2004)
ISBN 0-306-47904-4

Quantum computing in solid state systems
B Ruggiero, P Delsing, C Granata, YA Pashkin, P Silvestrini
Springer Science & Business Media (2006)
ISBN 0-387-26332-2

Macroscopic Quantum Coherence and Quantum Computing
DV Averin, B Ruggiero, P Silvestrini
Springer Science & Business Media (2001)
ISBN 0-306-46565-5

Nano-Electronics Devices
J Pekola, B Ruggiero, P Silvestrini
Springer Science & Business Media (2012)
ISBN 0-306-47266-X

Elements of Modern Physics for Quantum Information
V. Corato, C. Granata, B. Ruggiero and P. Silvestrini,
Aracne Editrice Roma (in italian), 2005.
ISBN 88-7999-938-9

**Editor of Special Issue of an international magazine**

Special issue of Journal of Superconductivity, Volume 12 number 6 (December 1999)

JOUSEH 12(6) 681-850 " Macroscopic Quantum Tunneling and Coherence"
P.Silvestrini, B. Ruggiero, F. Petruccione and A. Barone Eds.
ISSN0896-1107

**Selected Publications on International Journals**

Observation of energy levels quantization in underdamped Josephson junctions above the classical-quantum regime crossover temperature
P Silvestrini, VG Palmieri, B Ruggiero, M Russo
Physical Review letters 79 (16), 3046 (1997)

Effect of dissipation on thermal activation in an underdamped Josephson junction: First evidence of a transition between different damping regimes
P Silvestrini, S Pagano, R Cristiano, O Liengme, KE Gray
Physical Review letters 60 (9), 844 (1988)

Current distributions of thermal switching in extremely underdamped Josephson junctions
P Silvestrini, O Liengme, KE Gray
Physical Review B 37 (4), 1525 (1988)

Supercurrent decay in underdamped Josephson junctions: Nonstationary case
A Barone, R Cristiano, P Silvestrini
Journal of applied physics 58 (10), 3822-3826 (1985)

Supercurrent decay in extremely underdamped Josephson junctions
B Ruggiero, C Granata, VG Palmieri, A Esposito, M Russo, P Silvestrini
Physical Review B 57 (1), 134 (1998)

Effects of level quantization on the supercurrent decay in Josephson junctions: The nonstationary case
P Silvestrini, YN Ovchinnikov, R Cristiano
Physical Review B 41 (10), 7341 (1990)

Demonstration of macroscopic coherence and decoherence by adiabatic inversion, application to the SQUID
P Silvestrini, L Stodolsky
Physics Letters A 280 (1-2), 17-22 ( 2001)

Effects of energy-level quantization on the supercurrent decay of Josephson junctions
B Ruggiero, MG Castellano, G Torrioli, C Cosmelli, F Chiarello, VG Palmieri, C Granata, P Silvestrini
Physical Review B 59 (1), 177 (1999)

Resonant macroscopic quantum tunneling in SQUID systems
P Silvestrini, B Ruggiero, YN Ovchinnikov
Physical Review B 54 (2), 1246 (1996).

Josephson device for quantum experiments

C Granata, V Corato, L Longobardi, M Russo, B Ruggiero, P Silvestrini
Applied Physics Letters 80 (16), 2952-2954 (2002).

Supercurrent decay of Josephson junctions in non-stationary conditions: experimental evidence of macroscopic quantum effects
P Silvestrini, B Ruggiero, C Granata, E Esposito
Physics Letters A 267 (1), 45-51 (2000)

Extremely underdamped Josephson junctions for low noise applications
B Ruggiero, C Granata, E Esposito, M Russo, P Silvestrini
Applied Physics Letters 75 (1), 121-123 ( 1999)

Resonant macroscopic quantum tunneling in small Josephson junctions: Effect of temperature
P Silvestrini, B Ruggiero, YN Ovchinnikov, A Barone
Physical Review B 53 (1), 67 (1996)

Measurement of the effective dissipation in an rf SQUID system
B Ruggiero, V Corato, C Granata, L Longobardi, S Rombetto, P Silvestrini
Physical Review B 67 (13), 132504 (2003)

Temperature dependence of macroscopic quantum effects in non-stationary conditions
P Silvestrini
Physics Letters A 152 (5-6), 306-310 (1991)

Stacked Josephson junctions in view of macroscopic quantum experiments
C Granata, V Corato, A Monaco, B Ruggiero, M Russo, P Silvestrini
Applied Physics Letters 79 (8), 1145-1147(2001)

Tunable josephson devices for quantum computation
V Corato, C Granata, S Rombetto, B Ruggiero, M Russo, R Russo, ...
IEEE Transactions on Applied Superconductivity 17 (2), 132-135 (2007)

Observation of macroscopic quantum tunnelling in a rf superconducting quantum interference device system
V Corato, S Rombetto, P Silvestrini, C Granata, R Russo, B Ruggiero
Superconductor Science and Technology 17 (5), S385 (2004)

Inhomogeneous superconductivity in comb-shaped Josephson junction networks
P Sodano, A Trombettoni, P Silvestrini, R Russo, B Ruggiero
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YN Ovchinnikov, P Silvestrini, V Corato, S Rombetto
Physical Review B 71 (2), 024529 (2005)

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experimental data
P Silvestrini, B Ruggiero, YN Ovchinnikov, A Esposito, A Barone
Physics Letters A 212 (6), 347-349 (1996)

Adiabatic evolution of a coupled-qubit Hamiltonian
V Corato, P Silvestrini, L Stodolsky, J Wosiek
Physical Review B 68 (22), 224508 (2003)

Design of adiabatic logic for a quantum CNOT gate
V Corato, P Silvestrini, L Stodolsky, J Wosiek
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YN Ovchinnikov, P Silvestrini, B Ruggiero, A Barone
Journal of Superconductivity 5 (5), 481-484 (1992)

Vertical Josephson interferometers for quantum computation
B Ruggiero, C Granata, M Russo, V Corato, P Silvestrini
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A multi-qubit system for a scalable adiabatic quantum evolution
T Roscilde, V Corato, B Ruggiero, P Silvestrini
Physics Letters A 345 (1-3), 224-230 (2005)

rf SQUID system as tunable flux qubit
B Ruggiero, C Granata, A Vettoliere, S Rombetto, R Russo, M Russo, P Silvestrini
Physics Letters A 356 (6), 435-438 (2006)

Simulations of quantum gates with decoherence
V Corato, P Silvestrini, A Görlich, P Korcyl, J Wosiek, L Stodolsky
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V Corato, T Roscilde, B Ruggiero, C Granata, P Silvestrini
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NANO-SQUIDs based on niobium Dayem bridges for nanoscale applications
C Granata, A Vettoliere, P Walke, E Esposito, C Nappi, P Silvestrini,
Journal of Physics 234 (4), 042010 (2010)

Niobium NanoSQUIDs Based on Sandwich Nanojunctions: Performance as a Function of the Temperature
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experimental study
A Vettoliere, O Talamo, B Ruggiero, P Silvestrini, C Granata
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C Granata, P Silvestrini, B Ruggiero, A Vettoliere
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P Silvestrini, U Amato, A Vettoliere, S Silvestrini, B Ruggiero
Technological Forecasting and Social Change 116, 1-12 ( 2017)

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A Vettoliere, B Ruggiero, M Valentino, P Silvestrini, C Granata
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