

## ***CURRICULUM VITAE ET STUDIORUM OF GINO TAROZZI***

Gino Tarozzi [REDACTED] philosopher of science and non standard quantum theoretician, has investigated the relationships between physics and epistemology, showing the success of a reformulation of the main metaphysical principles in the history of scientific and philosophical thought, like realism, causality, holism, nothing, and the mind-body problem, in terms of empirical meaningful philosophical principles, that can be usefully compared with the descriptions of the world provided by fundamental physical theories.

He carried out his academic studies with two masters of the Bologna *Alma Mater Studiorum*: Alberto Pasquinelli, philosopher of science, pupil of Rudolf Carnap, founding father of logical positivism, and Antonio Pignedoli, eminent mathematical physicist, in his youth deputy of the Constituent Assembly of the Italian Republic, who was very critical of the standard subjectivist interpretation of quantum mechanics. Tarozzi was thus influenced both by the neopositivistic anti metaphysical approach of the former and by the latter's yearning for a realistic and causal interpretation of quantum mechanics: Accordingly, he studied the foundations of physics, focusing on the open problems of quantum mechanics on the one hand, and general questions in the theory of knowledge on the other. He received his degree in philosophy in 1977, upon discussing a dissertation on the epistemological foundations of quantum theory. Part of this dissertation, appeared few months later on *Il Nuovo Cimento*, was considered "tres interessant" by Louis de Broglie.

At that time Tarozzi had already begun to work together with one of the most distinguished scholars of foundations of quantum mechanics, the theoretical physicist Franco Selleri, with whom he subsequently developed a research program on some crucial connections between physics and philosophy. He became then acquainted with the philosopher Evandro Agazzi, and was deeply influenced by the idea that philosophy of science cannot be restricted to the formal and linguistic problems of theories, but should tackle problems of content and of natural philosophy as well. The philosophy of physics should study both the conceptual foundations of theories and their epistemological implications. On the other hand, and this is his new proposal, those philosophical questions may be analyzed in a non-metaphysical way by applying the neopositivistic criteria of meaning: for, although they failed as a demarcation of scientific propositions, they allow the reformulation of some metaphysical propositions as philosophical principles endowed with empirical meaning.

After graduation, Tarozzi started a ten years long cooperation with the Institute for Cultural Heritage of the Region Emilia-Romagna, for which he took charge of the knowledge and preservation of historical materials of science, and in particular of scientific instruments, which are present in academies, universities, museums, and scientific laboratories. This investigation proved with perspicuous concreteness the continuity of our scientific tradition with respect to the Galilean one together with its fruitful experimental instances. From such research the methodological legacy of Galileo appeared implemented by scientists and technologists of the following centuries in Emilia and Romagna, to the point that their contribution to the history of science could not be separated from their role in the design and in the construction of new instruments and apparatuses of investigation, as in the case of Campani's lenses, Ramazzini's barometer, Nobili's astatic galvanometer, Melloni's bench, Amici's telescopes, Righi's oscillator and Marconi's radio.

These results can be easily extended from this specific case to the history of science in general in the sense that the history of (empirical) science is not only the history of scientific theories, but also the history of scientific instruments of measurement and observation. He has recently resumed his studies in the history of science, assuming in 2012 the coordination of the international network “Archimedes in the Renaissance: The Origins of Modernity”, created between different institutions, such as the Max-Planck-Institut für Wissenschaftsgeschichte of Berlin, the Centro Internazionale di Studi "Urbino e la Prospettiva", the Department of History and Philosophy of Science of the Indiana University, the Dornsife College of Letters, Arts, and Sciences of the University of Southern California, the Department of Human Sciences of the Osaka Prefecture University, with the objective of promoting collaborative research, developing projects, organizing meetings and conventions, focusing especially on understanding of the history of science from its Greek and Latin roots to the present day, with particular emphasis on the period stretching from the Renaissance to the Scientific Revolution

In 1985 Tarozzi began his collaboration with the University of Urbino, organizing one of the main international congresses for the 50th anniversary of the Einstein, Podolsky, Rosen paradox (EPR), a subject he has always been particularly interested in, and “to the examination of which has made a substantial and original contribution” according to the collegial judgement expressed in 1987 by the commission of the competition for associate professor of Complements of General Physics, from which he withdrew his candidature having been approved in the meantime winner in another competition for professor of Philosophy of Science. With the result of this, the University of Urbino appointed him as associate professor in Philosophy of Science (1987-93), then full professor in Logic and Philosophy of Science in 1994. In earlier years he served as Chairman of the Corso di laurea (B.A. program) in philosophy (1995-98), Head of the Institute of Philosophy “Arturo Massolo” (1998-2004), Coordinator of the Dottorato di Ricerca (Ph.D. program) in Philosophical Anthropology and Foundations of the Sciences (2001-2009), Chairman of the Corso di studi specialistico (M.A. program) in Theories of Knowledge, Morals and Communication (2004-05), Head of the Faculty of Literature and Philosophy (2005-09) and of the new Department of Philosophy (2009-10). Within the Urbino University he has gathered one of the prominent groups of research in the philosophy of science, and especially in the foundations of quantum physics, a group including Vincenzo Fano, appointed to a second chair of associate professor of Logic and Philosophy of Science, with whom he is fruitfully cooperating for several years, Mario Alai, associate professor of Theoretical Philosophy, Claudio Calosi, lecturer of Philosophy of Nature, Pierluigi Graziani, lecturer of Logic and Informatic, Isabella Tassani, lecturer of History of Science, and moreover Alexander Afriat, now maitre de conference in History and Philosophy of Science at the University of Brest, Gennaro Auletta aggregate professor of Philosophy of Science at the Pontifical Gregorian University, Rossella Lupacchini, associate professor of Logic and Philosophy of Science at the Bologna University, Giulia Giannini, researcher at the Max Planck Institute for the History of Science in Berlin, Flavia Marcacci, professor of History of Scientific Thought at the Pontifical Lateran University. As it was recently pointed out by Evandro Agazzi:

My contacts with Urbino were further consolidated after the arrival in this University of Gino Tarozzi, a philosopher of science who carried out important studies in the field of philosophy of physics and who, in particular, shares with me a realist conception of science. (...)

On these occasions I also had the opportunity to know and appreciate some of his valuable collaborators and disciples, which ensure to this University a solidity in the field of the studies of philosophy of science that, despite appearances, it is not easy to achieve in most Italian universities.

From 1995 to 2000, and again since 2005, he has been the Director of the Centre for Research in the Philosophy and Foundations of Physics of the Universities of Bologna, Insubria, Salento and Urbino.

Tarozzi is corresponding member of the Accademia Nazionale di Scienze, Lettere e Arti of Modena (1989-), of the Accademia delle Scienze dell'Istituto of Bologna (1994-), and of the New York Academy of Sciences (1997-), permanent member (2009-) and from 2015 vice president of the Académie Internationale de Philosophie des Sciences (AIPS). From 1996 to 1999, he chaired the Società Italiana di Logica e Filosofia delle Scienze (SILFS).

His research aims to contribute to the critical analysis and conceptual clarification of some of the foundational problems still unsolved in the standard interpretation of quantum theory. They cluster around three main questions: (a) the interpretation of the wave function, and the related problem of the dual behaviour of microphysical objects; (b) the theories of measurement and the postulate of reduction of the wave function, along with the problems concerning the formal description of measurement instruments in quantum formalism; (c) the incompatibility, displayed by the EPR argument and Bell's theorem, between the empirical prescriptions of the principle of local reality and the predictions of quantum theory.

Concerning the interpretation of the wave function, he rejected Born's probabilistic (and corpuscular) approach, developing some ideas originally due to de Broglie and Selleri and suggesting a new realistic interpretation based on "quantum waves", viewed as objects endowed with merely relational properties. He then conceived some experiments able to discriminate between such a realistic interpretation and the orthodox one, which has been realized by experimental physicists like Mandel and Hardy, confirming a smooth form of complementarity. More recently he has proposed with G. Auletta a further experiment, where wave-like properties are associated to quantum states endowed with surprising formal analogies with *entanglements*, discriminating between the reality of quantum waves and the reality of the predictable properties.

On the Einstein-Bell contradiction he suggested an extension of the validity domain of Bell's theorem, showing that Bell's inequality is satisfied also by the best known non-local theories, like Newtonian dynamics and de Broglie's and Bohm's hidden variables theories; he has found some proofs of the EPR paradox and Bell's theorem based only on the principle of local reality, with no need of hidden variables; he criticized Clauser and Horn's probabilistic proof of Bell's theorem. In further works, some of which in cooperation with Franco Selleri, he has shown how a probabilistic proof of Bell's theorem may be given without recourse to the factorizability hypothesis, thus avoiding Clauser and Horne's (and many other authors') unjustified identification between statistical independence and the physical notion of separability. As it was stressed by Karl Popper in 1985:

F. Selleri and G. Tarozzi found a model that satisfies Bell's definition of locality but not the Clauser-Horne definition of locality (also known as the 'factorizability condition'); this seems to show again that Clauser and Horne have not established the Universality Claim.

In order to do so, he defined physical reality without using the notion of predictability with certainty, thus providing a probabilistic generalization of EPR's criterion. The value of these contribution was stated by Max Jammer, one of the greatest historians of science of last century, in his opening speech of the 1991 conference in memory of John Bell:

Other current developments concerning Bell's inequalities, which promise further to clarify their significance, contains certain elaboration of ideas which had been mentioned already in 1980 by A. Garuccio and F. Selleri and in 1981 by F. Selleri and G. Tarozzi in their attempts at systematically derivating all Bell-type inequalities, but only recently explored as to their experimental consequences.

Of the measurement problem he mainly discussed some epistemological aspects, with particular regard to the mind-body problem, negative result measurements, and the implications of macrorealistic theories, showing that even a satisfactory physico-mathematical account of the reduction process would still leave unsolved the more serious problem of the entangled superposition states. He also studied the epistemological and methodological aspects of measuring and experimental instruments in the history of classical mechanics and electromagnetism.

These foundational researches are based on his reformulation of the demarcation criterion, allowing for philosophical sentences that are meaningful, but non-falsifiable. Cases in point are

- the realistic hypothesis of Lewis "If all minds disappear from the universe, stars still go on on their courses", analyzed in "Testability and Meaning" by Carnap, who highlighted how this was a statement satisfying the most stringent requirements of factual significance since it is testable, albeit incompletely;
- the EPR principle of physical reality, indirectly verifiable, according to the definition given by Alfred Ayer, who remarked in a letter to Tarozzi of 1981:

I agree you have shown the possibility to obtain non trivial empirical consequences from what you choose to call a realist philosophical hypothesis, but I am non persuaded that your result could be interpreted by an instrumentalist accordig to his own fashion.

-the probabilistic generalizations of the EPR principle.

In a similar way Tarozzi has shown that there are at least four formulations of the principle of causality endowed with empirical meaning and contradicting the orthodox interpretation of quantum theory: Laplace' determinism, causality as lawfulness according to Kant's second analogy of experience, Mill's principle of the uniformity of nature, and Hume's causality as ordered connection which excludes any reversal of the temporal order. Moreover, he analyzed the mind-body problem with respect to von Neumann's and Wigner's subjectivistic interpretation, pointing out the paradoxical consequences of orthodox quantum mechanics and the need of alternative theories.

Such a possibility of reformulations endowed with empirical meaning of metaphysical principles has been furtherly extended to holism, strongly supported by quantum mechanical description based on entangled states and even to the archimetaphysical concept of nothing, stressing how the reality of nothing, implied by a new quantum paradox, represents an argument against the idea that (only) macroscopical properties are real.

## **ACADEMIC EXPERIENCE**

### **vice-président de l'Académie Internationale de Philosophie des Sciences (AIPS)**

September 2015 - present

### **coordinator of the international network "Archimedes in the Renaissance: The Origins of Modernity"**

Max-Planck-Institut für Wissenschaftsgeschichte of Berlin, Centro Internazionale di Studi "Urbino e la Prospettiva", Department of History and Philosophy of Science of the Indiana University, Dornsife College of Letters, Arts, and Sciences of the University of Southern California, Department of Human Sciences of the Osaka Prefecture University

September 2012 - present

### **permanent member of Académie Internationale de Philosophie des Sciences**

September 2009 - Present

### **Director of Centre for Research in the Philosophy and Foundations of Physics**

of the Universities of Bologna *Alma Mater Studiorum*, Insubria, Salento and Urbino Carlo Bo

September 2006 - Present

### **corresponding member of New York Academy of Sciences**

April 1997 - Present

### **full professor of Logic and Philosophy of science**

University of Urbino "Carlo Bo"

November 1994 - Present

### **corresponding member of Accademia delle scienze dell'Istituto di Bologna**

Class of Moral Sciences

July 1994 - Present

### **corresponding member of Accademia nazionale di scienze, lettere e arti di Modena**

Class of Physical Sciences

February 1989 - Present

### **Assesseur at Académie Internationale de Philosophie des Sciences**

April 2011 – September 2015

### **Head of Department of Philosophy**

May 2009 - December 2010

### **Dean of Faculty of Literature and Philosophy**

November 2005 - May 2009

### **Chairman of Faculty Board (M.A. program) in Theories of Knowledge, Morals and Communication**

October 2004 - October 2005

### **Coordinator of Dottorato di Ricerca (Ph.D. program) in Philosophical Anthropology and Foundations of Sciences**

April 2001 - October 2005

**Head of Institute of Philosophy “Arturo Massolo”**

November 1998 - October 2004

**vice president of Italian Society for Logic and Philosophy of Science (SILFS)**

April 1999 - May 2002

**Director of School of Advanced Studies in The Foundations and Philosophy of Physics**

September 1998 - September 2000

**Director of Centre for Research in the Philosophy and Foundations of Physics**

Universities of Bologna and Urbino

April 1995 - September 2000

**President of Italian Society for Logic and Philosophy of Science (SILFS)**

February 1996 - March 1999

**head of local operative unit C.N.R. research project**

of the Universities of Bologna, Florence, Urbino

February 1995 - May 1998

**Chairman of Faculty Board (B.A. program) in Philosophy**

February 1995 - February 1998

**national coordinator of joint research project of the Universities of Bologna, Chieti and Urbino**

January 1994 - November 1997

**associate professor of Philosophy of science**

Faculty of Literature and Philosophy, University of Urbino

June 1988 - November 1994

**local coordinator of operative unit of the MURST 40% research group**

January 1991 - November 1993

**Researcher at Istituto per i Beni Culturali, Regione Emilia Romagna**

June 1978 - June 1988

**Lecturer of History of philosophy**

Faculty of Education , University of Urbino

November 1985 - June 1987

**Lecturer of Contemporary philosophy**

Faculty of Literature and Philosophy, University of Perugia

November 1977 - June 1981

## LIST OF PUBLICATIONS

### Logic and Philosophy of Science (M-FIL/02)

"Realistic Interpretation of Physical Theories", *Mem. Acc. Naz. Sci. Lett. Arti Modena XX*, 49-61 (1978)

"Is Nondistributivity for Microsystems Empirically Founded?" with F. Selleri, *Nuovo Cimento 43B*, 31-40 (1978)

"Remarques sur les concepts de localité séparabilité et réalité physique", *Proceedings of the 2e Colloque Indeterminisme Quantique et Variables Cachées*, Geneva, November (1979)

"The Conceptual Development of the E.P.R. Argument", *Mem. Acc. Naz. Sci. Lett. Arti Modena XXI*, 353-373 (1979)

"The Principle of Empiricism and Quantum Theory", *Epistemologia III*, 13-28 (1980)

"Realism as a Meaningful Philosophical Hypothesis", *Mem. Acc. Sci. Bologna VII*, XIII, 89-98 (1980)

"On the Relevance of the Realist Assumption in the Proof of Bell's Inequality", *Mem. Acc. Naz. Sci. Lett. Arti Modena XXII-XXIII*, 81-86 (1980-1981)

"Realisme d'Einstein et mécanique quantique: un cas de contradiction entre une théorie physique et un hypothèse philosophique clairement définie", *Revue de Synthèse 101-102*, 125-158 (1981)

"On the Essential Role of the Realist Hypothesis in All Derivations of E.P.R.-type Paradoxes", *Epistemologia IV*, 407-422 (1981)

"Physical Reality: from the Metaphysical Notion to its Empirical Definition", in *The Concept of Physical Reality*, Zacheropoulos, Atene (1983), pp. 197-215

"Teoria e strumento in microfisica", *Epistemologia 8*, 83-118 (1985)

"Filosofia della Fisica", in *La filosofia della scienza in Italia nel '900*, ed. by E. Agazzi, Angeli, Milano (1986), pp. 337-368.

"Critica alle interpretazioni del teorema di Bell", in *Logica e Filosofia della scienza oggi*, ed. by E. Agazzi, M. Mondadori, S. Tugnoli Pattaro CLUEB, Bologna (1986), vol. II, pp. 331-335.

"Probability and Determinism in Quantum Theory", in *Probability in the Sciences*, ed. by E. Agazzi, Kluwer, Dordrecht (1988), pp. 237-259.

"Interprétation realiste et niveaux de contrôlabilité de la théorie quantique", in *L'objectivité dans les différentes sciences*, ed. by E. Agazzi, Editions Universitaires, Fribourg (1988), pp. 153-163

"Science, Metaphysics and Meaningful Philosophical Principles", *Epistemologia, 11* (1988), pp. 97-104 and 229-23

"La scienza degli strumenti come problema della misurazione", *Giornale di Fisica*, XXIX , 239-252. (1988)

*Filosofia della microfisica*, Accademia Nazionale di Scienze, Lettere e Arti, Mucchi, Modena (1992)

*Il paradosso della realtà fisica. Le interpretazioni dell'argomento di Einstein-Podolsky-Rosen* , ed., Accademia Nazionale di Scienze, Lettere e Arti, Mucchi, Modena (1992)

"Carnap e il problema del significato delle proposizioni filosofiche ", *Mem. Acc. Naz. Sci. Lett. Arti, Modena* , VII, VIII, 73-80 (1993)

"Il rifiuto della causalità nella filosofia della fisica prequantistica", with G. Filippini, *Mem. Acc. Naz. Sci. Lett. Arti, Modena* , VII, XI, 97-104 (1993)

"L'ipotesi macrorealistica di Lewis-Carnap e le descrizioni del mondo fisico", in Proceedings of the conference *L'eredità di Rudolf Carnap* , ed. by A. Pasquinelli, CLUEB, Bologna (1995); pp. 263-276

"Realismo empirico e meccanica quantistica", with V. Fano, in *Ancora sul realismo* , ed. by G. Giuliani, University of Pavia and Istituto Italiano per gli Studi Filosofici, Pavia (1995); pp. 144-168

"Interpretazione realistica e implicazioni acausali dei concetti e dei principi della microfisica", in *Fondamenti e Filosofia della Fisica* , ed. by V. Fano, Il Pontevecchio, Cesena (1996); pp. 123-144

"Keynes e l'applicazione del calcolo delle probabilità alle scienze", with V. Fano, *Mem. Acc. Naz. Sci. Lett. Arti Modena* , XII, 149-162 (1996)

"Ermeneutica e fisica moderna", with V. Fano, *Hermeneutica*, 277-296 (1997)

*Prospettive della logica e della filosofia della scienza*, Proceedings of the Società Italiana di Logica e Filosofia della Scienza, ed. with V. Fano and M. Stanzone, Rubettino (2001); therein

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"Leggi fisiche e leggi logiche. Ricordo di G. Gemignani", *Atti Acc. Naz. Sci. Lett. Arti Modena VIII*. vol. VI (2003); pp.142-144

"Interpretazioni ortodosse e interpretazione realistica della funzione d'onda", in *Quanti Copenhagen?*, ed. by I. Tassani, Accademia Nazionale di Scienze, Lettere e Arti, Editrice Il Ponte Vecchio, Cesena (2004); pp. 163-168

"Realismo fenomenologico e meccanica quantistica", with V. Fano, in *Proceedings of the conference in memory of Enzo Melandri*, Quaderni dell'Istituto di Filosofia, Urbino, (2005)

"Stati mentali agenti istantaneamente a grande distanza su stati fisici. Un ulteriore paradosso quantistico per la relazione mente-materia", with A. Afriat, *Teorie e Modelli*, special issue, pp.45-63 (2005)



"Logica, dialettica e complementarità", with V. Fano, in *Proceedings of the conference in memory of Livio Sichirollo*, Bibliopolis, Napoli, 2006; pp. 123-143

*Karl Popper Philosopher of Science*, ed. with M. Alai, Rubbettino, Soveria Mannelli (2006); therein "Popper and the Criticism to the Heisenberg Principle; pp. 245-276

"Logical Positivism, Quantum Mechanics and the Meaning of Philosophical Principles", in *The Controversial Relations between Science and Philosophy*, ed. by G. Auletta, Libreria Editrice Vaticana, Vatican City (2006); pp. 129-166

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"Realismo scientifico e realismo empirico: è possibile discriminare sperimentalmente nel caso della meccanica quantistica?" with I. Colagè, *Isonomia*, vol. IX, special issue, p. 131-156, ISSN: 2037-4348 (2009)

"Fisica, metafisica e criteri di conferma empirici, *Giornale di fisica*, vol. 50, p. 51-61 (2009)

"Vedere e rivedere l'inosservabile doppia natura della realtà quantistica" with C. Sedda. *Isonomia*, vol. X, pp. 1-19 (2010)

"I principi metafisici sono veramente privi di significato?" with P. Graziani, in *Un 'austriaco' in Italia. Festschrift in onore del professor Dario Antiseri*, ed. by R. De Mucci, K. Leube, p. 637-651, Soveria Mannelli, Rubbettino (2011)

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"Holism as an empirically meaningful metaphysical hypothesis", with C. Calosi and V. Fano, *Epistemologia*, vol. 35, p. 45-57 (2012)

"Oltre la fisica normale. Realtà della funzione d'onda e delle proprietà fisiche prevedibili nell'interpretazione di Selleri della meccanica quantistica", *Isonomia*, pp.223-250 (2013)

"Physics, Metaphysics and the Reality of Nothing in Quantum Mechanics", with P. Graziani, in *Science, Metaphysics and Religion. Proceedings of the 2013 AIPS Conference*, ed. by E. Agazzi, Franco Angeli, Milan (2014); p. 117-128

"Remarks and autobiographical notes", in *Gino Tarozzi Philosopher of Physics*, ed. by V. Fano, Franco Angeli, Milan (2014); pp. 193-204

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## **Theoretical Physics, Foundations of Quantum Mechanics (FIS/02)**

"Nonlocal Theories Satisfying Bell's Inequality", with F. Selleri, *Nuovo Cimento* 48B, 120-130 (1978)

"Extension of the Domain of Validity of Bell's Inequality", with F. Selleri, *Epistemological Letters* 21, 1-21 (1978)

"Is Clauser and Horne's Factorability a Necessary Requirement for a Probabilistic Local Theory?" with F. Selleri, *Lett. Nuovo Cimento* 29, 533-536 (1980)

"Quantum Mechanics, Reality and Separability", with F. Selleri, *Rivista Nuovo Cimento*, vol. 4(2), 1-54 (1981)  
discussed by De Muynck W.M. & Van Stekelenbor J.T.P.M 1986, "Discussion of a proof, given by Selleri and Tarozzi, of the nonlocality of quantum mechanics", *Phys. Letters A* 116: 420.

"Local Realism and Bell's Theorem Without the Hidden Variable Hypothesis", *Mem. Acc. Sci. Torino* 108, 119-124 (1981)

"The Theory of Observations, Wigner Paradox and the Mind-Body Problem", *Epistemologia* IV, 37-52 (1981)

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"A Probabilistic Generalisation of the Concept of Physical Reality", with F. Selleri, *Speculations in Science and Technology* 6, 55-64 (1983)

"From Ghost to Real Waves: a Proposed Solution to the Wave-Particle Dilemma", in *The Wave-Particle Dualism*, ed. by S. Diner, D. Fargue, G. Lochak and F. Selleri, Reidel, Dordrecht (1984), pp. 139-148

"Experimental Tests of the Properties of the Quantum Mechanical Wave-Function", *Lett. Nuovo Cimento* 42, 439-442 (1985)

*Open Questions in Quantum Physics*, ed, with Alwyn van der Merwe, Reidel, Dordrecht, (1985); therein "A Unified Experiment for Testing Both the Interpretation and the Reduction Postulate of the Quantum Mechanical Wave Function", pp. 337-390

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"Why Quantum Mechanics is Incompatible with Einstein Locality", with F. Selleri, *Physics Letters* 119A, 101-104 (1986)  
discussed by de Baere W. 1988, "Some further comments on the Selleri-Tarozzi proof of the nonlocality of quantum mechanics", *Phys. Letters A* 131: 13.

*The Nature of Quantum Paradoxes. Italian Studies in the Foundations and Philosophy of Modern Physics*, ed. with A. van der Merwe, Kluwer, Dordrecht (1988); therein "The Italian Debate on Quantum Paradoxes", pp. 1-50.

*Microphysical Reality and Quantum Formalism*, with A. van der Merwe e F. Selleri, eds., 2 voll., Kluwer, Dordrecht, (1988)

"On the Different Forms of Quantum Acausality", in *The Foundations of Quantum Mechanics*, ed. by C. Garola e A. Rossi, Kluwer, Dordrecht (1995); pp.435-447

*Formalismo matematico e realtà fisica*, Proceedings of the conference in memory of Antonio Pignedoli, ed., Accademia Nazionale di Scienze, Lettere e Arti, Mucchi, Modena (1996); therein "Nuovi paradossi della teoria quantistica", pp.155-177

"Quantum Measurements and Macrophysical Reality: Epistemological Implications of a Proposed Paradox", *Foundations of Physics* 26, 907-917 (1996)

"Perspectives on the EPR and the Measurement Problem" in *Understanding Physical Knowledge*, ed. by R. Lupacchini e V. Fano, CLUEB, Bologna (2002); pp.121-146

*Bell's Theorem and the Foundations of Modern Physics*, with A. van der Merwe e F. Selleri, eds., World Scientific, Singapore (1992); therein "Bell's Theorem and the Conflict between the Two Basic Principles of Quantum Mechanics"; pp.448-457

"On the Implications of Generalised EPR states for the Completeness and Consistency of Quantum Theory" in *Proceedings of the Conference The Interpretation of Quantum Theory. Where Do We Stand?* Columbia University, New York, April 1992, Istituto dell'Enciclopedia Italiana, Roma (1994); pp. 257-264

"Nonlocality, Relativity, and Two Further Quantum Paradoxes", in *Open Questions in Relativistic Physics*, ed. by F. Selleri, Apeiron, Montreal (1998); pp. 149-160

"Wave-like Correlations versus Path Detection: Another Form of Complementarity", with G. Auletta, *Foundations of Physics Letters* 17, 889-895 (2004)

*For Franco Selleri on His Seventieth Birthday*, guest editor, special series of *Foundations of Physics*, 34-35, (2004); therein "On the Reality of Quantum Waves" with G. Auletta, 34, pp. 1675-1694

"Pre-measurement vs. Measurement. A Basic Form of Complementarity", with G. Auletta, in *The Foundations of Quantum Mechanics*, ed. by C. Garola et al., World Scientific, Singapore 2006; pp. 40-47

"Can Nothing Cause Nonlocal Quantum Jumps?", with A. Afriat, in *Quantum Mechanics. Are There Quantum Jumps?* ed. by A. Bassi et al., American Institute of Physics, Melville, New York (2006); pp. 3-7

*Lezioni in memoria di Giuliano Preparata*, with M. Pera, M. Fleischmann, E. Del Giudice, Bibliopolis, Napoli (2006); therein "Principi filosofici e principi della fisica. La riapertura delle controversie metafisiche nel dibattito sui fondamenti della meccanica quantistica"; pp. 21-39

"Quantum Ontology and Extensional Mereology" with C. Calosi e V. Fano, *Foundations of Physics*, vol. 41, p. 1740-1755 (2011)

“Is the Mind a Quantum Computer?” with C. Calosi, *Epistemologia* , XXXVI, pp. 194-206 (2013)

“Parthood and Composition in Quantum Mechanics”, with C. Calosi, in *Mereology and the Sciences*, ed. by C. Calosi and P. Graziani, Berlin: Springer: 53-84 (2014)

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## **History of Physics and Science Education (FIS/08)**

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