

Curriculum Vitae of Francesco Mallamace

Francesco Mallamace graduated in Physics in 1973. In 1974 he became "research and teaching assistant" at Purdue University (USA). In 1976 he obtained a professorship in charge of "Optics" at the University of Messina; and in 1981 became associate professor in "Structure of the Matter" and in 1986 in "General Physics". From 2000 on he is a Full Professor of "General Physics".

Francesco Mallamace's scientific activity, as testified by over 150 publications in international journals (with several published in journals of absolute excellence, e.g. *Science*, *Natures*, *PNAS*), focused mainly on the experimental study of Physics of Complex Systems and on radiation-matter interactions. He has given fundamental contributions to the study of these systems in non-equilibrium conditions and in non-ergodic transitions (gels, colloids, microemulsions, glasses, polymers, supercooled water, etc.). Furthermore, he developed new experimental techniques in the study of the radiation-matter interactions; especially by using high-intensity neutrons generated in nuclear reactors. In particular, one of the most used models is the "cap-and-gown" model (1995). By means of these techniques and by Nuclear Magnetic Resonance (NMR) he has studied, obtaining significant results, physical systems in non-linear thermal conditions.

In recent years (2005-2008), FM contributed to resolve one of the fundamental problems of Physics and Biology, namely: to explain definitively the origin of the anomalies of liquid water. For this research he was rewarded in 2007 by the National Accademy of Science USA with the justification: '*The most outstanding and original scientific discovery in the area of applied physical sciences published in 2006*'.

Recently an other obtained result, of wide scientific impact, is the demonstration that the Nuclear Magnetic Resonance technique can be successfully used for the characterization and the study of conformational and energetic properties of biological macromolecules such as proteins, enzymes, RNA and DNA. The technological application of these studies gives concrete perspectives to the early diagnosis of tumors (above all melanomas).

The interests and the scientific skills of Francesco Mallamace have extended also to areas of general interest for our Country, namely in the non-destructive diagnostic inquiries on the artistic heritage. In particular, FM has been the reference point, on these subjects, for some projects by the European Union.

From 1999 FM is a visiting professor of the Physics Department of the Boston University (BU) "*Center of Polymer Science*", where he collaborates on the study of the properties of water and biological systems.

From 1997 he is Research affiliated and Visiting Professor to the Massachusetts Institute of Technology (MIT, Cambridge-USA) at the "*Department of Nuclear Science and Engeneering*" where he teaches and conducts research on radiation-matter interactions and the use of Complex Liquids like "*fuel-moderator nanocontainers*" and "*cooling liquids*" as well as "*high-efficient heat-drivers*" for nuclear reactors of the next generation.

From 2001 FM is the scientific responsible of the Nuclear Magnetic Resonance (NMR) center of the *Consiglio Nazionale delle Ricerche* and of the *Istituto Nazionale per la Fisica della Materia* of Messina: a National Facility for the study of soft condensed matter and nano-materials of biological interests (national laboratory funded with European funds).

The research group of FM, at the University of Messina, takes part in one of the most prestigious research and training networks of the European Union; the network, named "Arrested Matter in colloidal science", is made up of 14 European and two American (USA) Universities.

For contributions given in the cited research areas, FM has given numerous invited lectures at the main congresses, conferences and international workshops; he wrote several "review papers" and scientific book chapters and was invited to collaborate with the editing of some prestigious international journals (*Physical Review E&B*, *Physical Review Letter*, *Physica A*, *J. of Chemical Physics*, *J. of the American Chemical Society*, *Langmuire*, *The Royal Phylosophycal Magazine*, *Il Nuovo Cimento*, *La Rivista del Nuovo Cimento*, *J. of Physical Chemistry (A and B)*, *J. De Physique*, *European Physical. J. E*, *J. of Physiscs Condensed Matter*, *Proceedings of the National Academy of Sciences*, *PNAS*, *Nature and Science*). FM is member of: *La Società Italiana di Fisica*, *The American Physical Society* (of whom he is also a fellow) and *American Chemical Society*.

FM has been engaged, in particular, in the development, promotion and diffusion of the above mentioned research themes on a global scale by promoting, organizing and directing several congresses both in Italy and abroad. On this regard, he as been, in the period 2005-2007, consultant of the European Parliament on research and technological development for the VIIthe European Framework Program (2007-2013). In this context he participate on 11-01-2006 at

the European Parliament to a Public Hearing on "People" program, a European program for the formation of '*European researchers*'.

Furthermore, FM is a distinguished person for his activity on training and formation of excellence. In fact, he organized and directed some international schools for young researchers. Among which, on account of the Italian Society of Physics, the prestigious *International School of Physics "Enrico Fermi"* of Varenna, which he organized and presided over twice. The schools, held in 1996 and in 2003, had as main topic "*The Physics of complex systems*", a research area that covers all the areas of Physics, from Nuclear- to Biophysics. Both the schools were remarkable for the number and the quality of the participants and the prestige of the lectures, given by the world-renowned researchers in the field.

FM between Messina, BU and MIT took care of, as responsible, the formation (degrees, PhD and post-Doc), of some tens of young researchers of different nationalities (*USA, France, Germany, Ireland, Japan, Holland, China, Taiwan, Australia, New Zealand, India, Israel, Greece, Spain, Brazil, Argentina, Mexico, Canada, Iran and of course Italy*), which are currently almost all occupied as university professors or researcher.

The research activity of FM, mainly framed in strategic international projects or projects of national interest (PRIN), has been supported throughout both by national research authorities (*Ministry of Research and Industry, CNR, ENEA, etc.*) and international authorities (*European Funds, PON, National Science Foundation and NASA (USA)*). Some of his researches were carried out in collaboration with national structures (*CNR, ENEA, Universities of Pavia, Roma, Milano, Perugia, Napoli, Firenze, Pisa*) and international structures (*MIT, Boston Univ., Parigi, LURE-Orsay, LLB-Saclay, Belfast, Dublin, Edinburgh, Bayreuth, Konstanz, Cologne, Los Angeles, New York, Tel Aviv, Tokio, etc.*). Regarding the research projects on the interaction "radiation-matter" and nuclear physics, FM benefited and continues to benefit from the availability of the structures (and the collaboration of researchers) of some "*American National Laboratories (USA)*", of which: Los Alamos, Oak Ridge, Argonne (Chicago), National Institute of Standard and Technology (Gaithersburg), Brookhaven (New York).

Organized Events

- 1) *III Europhysics Conference on Liquid Matter "Liquid of Small Molecules"* Santa Trada – Reggio Calabria Italy September 16-21 1987. Organizers: F. Mallamace and U. Buontempo
- 2) *IV European Colloid and Interface Society (ECIS) Meeting on Trends in Colloid and Interface Science*, Copanello, Italy September 22-28 1990. Organizers: F. Mallamace and M. Corti.
- 3) *International Conference on Complex Liquid Systems*, Polistena, Italy, July 5-10,1992. Organizer: F. Mallamace.
- 4) *First International Conference on Scaling Concepts and Complex Fluids*, Copanello, Italy, July 4-8,1994. Organizer: F. Mallamace.
- 5) *International School of Physics "Enrico Fermi" CXXXIV Course on The Physics of Complex Systems*, Varenna, Italy, July 9-19,1996. Directors: F. Mallamace and H.E. Stanley
- 6) *International Conference on The Morphology and Kinetics of Phase Separating Complex Fluids*, Messina, Italy, June 24-28,1997. Organizers: F. Mallamace, Sow-Hsin Chen and P. Tartaglia.
- 7) *International Workshop on The Physics of Complex Systems* Messina, Italy, June 31 Oct-3 Nov. ,1999. Organizer: F. Mallamace.
- 8) *International Conference on Scattering Studies of Mesoscopic Scale Structure and Dynamics in Soft Matter*, Messina, Italy, November 22-25, 2000. Organizers: F. Mallamace and Sow-Hsin Chen.
- 9) *International Congress on Scaling Concepts and Complex Systems (Satellite to STATPHYS21)*, Merida, Mexico, July 9-14, 2001. Organizers: F. Mallamace and J. Quintana.
- 10) *International Congress on Horizons in Complex Systems*, Messina, Italy, Dec. 5-8, 2001. Organizers: F. Mallamace, G. Malescio, S. Glotzer, P. Poole, G. Salvetti.
- 11) *International School of Physics "Enrico Fermi" CLV Course on The Physics of Complex Systems (New Advances and Perspectives)* Varenna, Italy, July 1-11,2003. Directors: F. Mallamace and H.E. Stanley.
- 12) *International Workshop on Physics of Structural Arrest Transitions in Colloidal Systems With Short-Range Attration*, Messina, Italy, Dec.17-21, 2003. Organizers: Sow-Hsin Chen, Francesco Mallamace, Francesco Sciortino.