



### **Olivier Kahn International Award**

The European Institute of Molecular Magnetism and the members of the Olivier Kahn Award International Jury are pleased to announce that the laureate of the eighth Olivier Kahn International Award is Dr. Mauro Perfetti, Assistant Professor at the University of Florence (Italy), and researcher at the Laboratory of Molecular Magnetism (LAMM).

Olivier Kahn was a pioneer in molecular magnetism, a brilliant scientist and teacher, and deeply committed to the promotion of talented young scientists. The European Institute of Molecular Magnetism follows the tradition of the MAGMANet European Network of Excellence that created a prestigious award bearing his name, the Olivier Kahn International Award, to honour a young scientist who has received his/her Ph. D. within the last 10 years. The award, an "Olivier Kahn Medal", designed by "La Monnaie de Paris", is accompanied by a prize of 2500 Euros, to help the laureate in his research.

The 2022 laureate, Dr. Mauro Perfetti, has made original contributions in the field of single-molecule magnets (or molecular nanomagnets) pushing forward the field of molecular magnetism, particularly how to better understand and master molecular anisotropy. The creative and coherent research endeavours of Mauro Perfetti were conceived and achieved to answer such a question.

The jury acknowledges the interdisciplinary approach to the research work, ranging from chemistry, the synthesis of molecules and crystal growth, to physical measurements and their interpretation and theoretical modelling thereof. This needs a combination of competences presented by the laureate at an excellent level, quite uncommon, and was the key to his remarkable achievements.

To study single-molecule magnets, the 2022 laureate, Mauro Perfetti, used and improved in a clever and very efficient way the cantilever torque magnetometry technique. He demonstrated that the technique provides invaluable information on magnetic anisotropy and on key parameters (symmetry, spin parity effect, ...) to better understand and improve the performances of molecular nanomagnets.

Combining magnetometry with a breadth of spectroscopic techniques such as inelastic neutron scattering, infra-red and far infra-red spectroscopy under field, and high-field electron paramagnetic resonance, the laureate established experimentally the crystal field parameters, the electronic structures and the energy spectrum of lanthanides complexes.

In a remarkable study of the magnetic anisotropy of the whole family of lanthanide complexes, especially with the dodecane tetracetic ligand (DOTA), he discovered phenomena never observed before, such as the  $4f^{n+7}$  effect or the “switch” between axial and planar anisotropy.

He used this precious fundamental new knowledge as a tool to propose guidelines to conceive more efficient molecular nanomagnets, to manipulate them by external stimuli (magnetic field, light) or to validate theoretical *ab initio* calculations.

In chemistry, the laureate mastered methodologies to prepare and to measure air-sensitive or radioactive actinides (a field still mostly unexplored).

He was the first to use magnetic anisotropy as a local probe to detect the orientation of a few layers of molecules deposited on surfaces.

The present and future research of Mauro Perfetti is focused on finding ways to incorporate magnetic molecules in devices, as qubits and qudits, and how to control their functionality by external stimuli (magnetic field, light). As a specific example, his future research plan aims at delivering unprecedented understanding of the spin electric effects in molecules and chemical guidelines for synthesizing molecular architectures with these effects on-demand to be used in the field of information technology.

Presenting the social importance of his work, Mauro Perfetti writes:

*“We live in the information era. Our daily life is now more than ever based on fluxes of digital information. Large and exponentially growing quantities of information are generated each day and must be processed and stored. Current and projected technologies will not satisfy this need. Also, for the processing of such amounts of information, new technologies must be developed. Magnetic molecules potentially provide a solution to these problems. Therefore, my research focuses on understanding and rationalizing the magnetic behaviour of molecules, as well as exploring environmentally friendly and more efficient ways to interact with molecules. If my research is successful, it will have a crucial impact on the activities of diverse communities that use information technology as a tool (e.g., security, climatology, communications, healthcare, economy).”*

The laureate is now working in the Department of Chemistry Ugo Schiff of the University of Florence as Assistant Professor, after a Ph.D. in the same University and post-doctoral stays in Stuttgart and Copenhagen. He is building his own research group in LAMM with many European and worldwide collaborations.

The international jury delivering the Award selected the laureate among a group of outstanding scientists, ladies and men, who have contributed actively to the development of molecular magnetism in Europe and have provided the international community with outstanding scientific results since their Ph.D. thesis, less than 10 years ago.

The members of the jury were impressed by the youth, the mobility, and the very high standard of the candidates of this edition. They are happy that all the candidates have now stable professional positions in their home laboratory or abroad, and that most of them are leading, or on the way to lead, their research team.

They wish the laureate and the candidates, full success in the development of their remarkable and challenging projects.

The Award will be presented to the laureate on July 4th at 18:00h during the European Conference on Molecular Magnetism, ECMM 2022, to be held in Rennes, France on July 4-7. The laureate will present an invited lecture on this occasion.

The European Institute of Molecular Magnetism (EIMM)

The members of the 2022 Olivier Kahn International Jury:

Dante Gatteschi, Honorary President, Emeritus Professor, Università degli Studi di Firenze, Florence, Italy

Michel Verdaguer, President, Emeritus Professor, Sorbonne Université, Paris, France

Santiago Alvarez, Emeritus Professor of Inorganic Chemistry, Universitat de Barcelona, Barcelona, Spain

Euan Brechin, Professor of Coordination Chemistry, School of Chemistry, University of Edinburgh, United Kingdom

Matteo Mannini, Associate Professor, LAMM, Firenze University, Firenze, Italy

Marvaud Valérie, CNRS Research Director, IPCM, Sorbonne Université, Paris, France

Van der Zant Herre, Professor, Institute of Nanoscience, Delft University of Technology, Delft, The Netherlands.

Firenze, June 15<sup>th</sup>, 2022

*Contact:*

*Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali (INSTM)*

*Via G. Giusti, 9, I-50121 Firenze, Italy*

*Tel. +39-055-23387.13 (direct line)*

*Fax +39-055-2480111*