

# The EPS Edison Volta Prize 2016 awarded to Michel A.G. Orrit

The European Physical Society [EPS], the Fondazione Alessandro Volta and Edison S.p.A. are delighted to announce the award of the 2016 EPS Edison Volta Prize for outstanding contributions to physics to

**Michel A.G. Orrit, from the Leiden University, the Netherlands**

"for seminal contributions to optical science, to the field of single-molecule spectroscopy and imaging (first single molecule detection by fluorescence and first optical detection of magnetic resonance in single molecule) and for pioneering investigations into the photoblinking and photobleaching behaviors of individual molecules at the heart of many current optical super-resolution experiments."

Professor Orrit has made significant contributions over several decades to push back the frontiers of optical physics and spectroscopy. More than 30 years ago, he produced very early and highly insightful work on Langmuir-Blodgett films and spectral hole-burning in the 1980's. After his efforts in 1989 at the University of Bordeaux to detect the optical absorption of a single molecule of pentacene in p-terphenyl, he demonstrated one year later that the optical absorption could be detected with greatly improved signal-to-noise ratio by detecting the fluorescence emitted from the single molecule. This critical and ground-breaking step opened the way for many subsequent investigations of single molecules throughout the 1990's up to the present. Indeed, essentially every group in the world has subsequently used fluorescence excitation as a result of this seminal work.

In a series of very impressive experiments, Michel Orrit systematically explored many facets of the behaviour and local dynamics of single aromatic hydrocarbons in molecular crystals at low temperatures. Major accomplishments in the 1990s included study of Stark effects in polymers, the beautiful demonstration of two-level system dynamics by autocorrelation of frequency fluctuations, temperature dependence of spectral diffusion in polymers, and optical detection of magnetic resonance and coherence effects for a single molecular spin. In the mid-1990's, Professor Orrit began to focus on various quantum optical effects that may be observed with a single molecule in a solid. After the first observation of photon antibunching for a single molecule in collaboration with the IBM group, Professor Orrit pushed forward to demonstrate ac Stark effects, hyper-Raman effects, Rabi resonances, and a triggered single photon source using adiabatic rapid passage. All of these experiments in his lab in France were "firsts", and placed Professor Orrit's group at the position of the premier group worldwide exploring quantum optical effects with single molecules in solids.

Throughout his subsequent career up to the present, Professor Orrit has shown an incredible ability to select and conquer some of the most interesting problems in modern molecular physics and spectroscopy. He has extended his efforts to study glass dynamics over a wide range of temperatures, has provided deep insight to the optical properties of metallic nanoparticles, and has even detected the optical absorption of single molecules at room



temperature using photo thermal effects. His deep and leading-edge research has yielded an array of new methods, new physical effects, and he has trained a number of talented young laser scientists.

When contacted, Michel Orrit expressed his warm thanks to the selection committee. He has been Professor in Molecular Physics at Leiden University since 2001. He is heading the Molecular Nano-Optics and Spins Group at the Leiden Institute of Physics.

### **EPS Edison-Volta Prize**

The EPS Edison Volta Prize promotes excellence in research and is given in recognition of outstanding research and achievements in physics. The EPS Edison Volta Prize is given biennially to individuals or groups of up to three people. The laureates receive a medal, which is a faithful reproduction of the "Medaglia Premio dell' Associazione per l'Incremento del Commercio in Como": a portrait of Alessandro Volta together with the saying: Alexandro Voltae Novocomensi, i.e. (dedicated) to Alessandro Volta from Novum Comum, which was the old name given to the city of Como by Julius Caesar.

The Prize was established in 2011 and was awarded for the first time in 2012 to R. D. Heuer, S. Bertolucci and S. Myers from CERN, Geneva and in 2014 to J.-M. Raimond from the Laboratory Kastler Brossel at the Collège de France, Paris. It was also given to three principal scientific leaders of the ESA's Max Planck Mission in 2015 in the frame of the International Year of Light 2015: N. Mandolesi, University of Ferrara, J.-L. Puget, Institut d'Astrophysique Spatiale, Université Paris Sud & CNRS, and J. Tauber, Directorate of Science and Robotic ESA (NL).

### **Background Information**

The European Physical Society provides an international forum for physicists and acts as a federation of 42 national physical societies. Founded in 1968, the EPS now has around 4000 individual members, and its Members Societies represent together over 130,000 physicists.

More info: [www.eps.org](http://www.eps.org)

The other partners and sponsors of the Prize are Edison S.p.A. ([www.edison.it](http://www.edison.it)) and the Centro di Cultura Scientifica "Alessandro Volta" ([www.centrovolta.it](http://www.centrovolta.it)).

