

# ESR Spectroscopy Group

Founded January 1969

<http://www.esr-group.org>



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## CONFERENCE REPORT 2018

The 51<sup>st</sup> Annual International Meeting of the ESR Group of the Royal Society of Chemistry has taken place in April 2018 at Queen Mary University of London. There were 120 participants from 16 countries. The organisers – Maxie Roessler and Enrico Salvadori – deserve a medal for their valiant victory over East London. The challenges, successfully overcome, had included a group of socialist student protesters who had occupied the conference dinner venue (in the true British capitalist spirit, a better venue was found quickly). Just a few days before the meeting, a child was born to Maxie and her husband. It does take a biologist to know the limits of human endurance, and to be present and in command nonetheless. Maxie received a standing ovation.



The unique atmosphere and architecture of East London were every bit as fascinating as the weather, and shared much of the colour palette with it. A particular highlight was the group of historic buildings, merchants and temples just outside the hotel. It was universally acknowledged that the charming place and its surroundings were still carrying the spirits of Charles Dickens and Edgar Allan Poe.

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## Bruker Prizes

Since 1986, Bruker Corporation has generously sponsored an annual lectureship and prize, given to a scientist who has made a major contribution to the application of ESR spectroscopy in chemical or biological systems. The Bruker Prize 2018 was awarded to Professor Sabine Van Doorslaer, University of Antwerp for her outstanding contributions to application-oriented method development and for cutting-edge studies of proteins, materials, and catalysts.

In his laudatory speech, Professor Gunnar Jeschke noted that Sabine van Doorslaer applied a broad arsenal of advanced pulsed ESR techniques at different frequencies, and analysed ESR spectra based on quantum-chemical computations in order to understand the spatial and electronic structure of paramagnetic systems. Thanks to her, it had become known how structurally diverse the heme centres are and how this structural diversity was related to function. Her collaborative work on asymmetric homogeneous catalysis stands out in this field. Prof van Doorslaer published a number of fine papers on the measurement of small hyperfine couplings, and on signal processing in ESEEM very early on in her career. Beyond her research achievements, she a great teacher who has strongly contributed to the cohesion of ESR community. She is a regular and well-liked lecturer at summer schools of the European Federation of EPR Groups, and has chaired the European COST Action on Advanced Paramagnetic Resonance Methods in Molecular Biophysics. Currently, she is the President of the European Federation of EPR Groups. The 2018 Bruker lecture titled "*Hyperfine companions on a journey through the world of (bio)materials*" was followed by the Bruker reception.

The other annual EPR prize sponsored by Bruker is the Thesis Prize, set up to recognise outstanding work by PhD students in the field of ESR Spectroscopy. The Committee received nine applications from the students who had submitted their thesis in the previous two years. By reading the summaries and the support letters from supervisors and examiners, the Committee narrowed the field down to three submissions and then went through the considerable job of reading each thesis in depth. It was abundantly clear that the extraordinary scientific work by Audrey Bienfait was the winner. The best way to illustrate the achievement is to quote from the reports by the selection committee:

*"This is the first experimental observation of the Purcell effect. When the Nature paper reporting the work was published, I immediately recognized its importance and made it the focus of one of my weekly EPR tutorials. The thesis demonstrates deep scholarship and understanding of this striking new perspective on spin relaxation. The scholarship covers a wide range of topics relevant to the key experiments and the theoretical background. There is good assessment of the relative effects of various experimental parameters. A prize lecture on this topic will be the highlight of the meeting."*

*"Nearly everyone in Magnetic Resonance had so far treated radiofrequency and microwave irradiation as "the  $B_1$  field" – a one-way term in the spin Hamiltonian with a cosine in front and a tendency to complicate the mathematics. That is, of course, an approximation: in a good enough resonator the electromagnetic field is detectably quantised, and a two-way quantum mechanical interaction exists between the spins and the electromagnetic field – a generalisation of the Zeeman effect. However, extraordinary extents of miniaturisation, electronic engineering and cooling are required to make it visible. This work has accomplished the feat. It reports the first experimental observation of the Purcell effect – a two-way quantum mechanical interaction between the electromagnetic field of the resonator and the spins inside it. The effect is strong enough to be the dominant relaxation mechanism for the systems reported, meaning that spins can be re-set on demand by the instrument electronics. As well as being a fundamental achievement in spin physics, this work opens up entirely new research avenues in quantum systems engineering."*

All attendees were very impressed and noted, with gratitude, that Bruker was again a major force behind making the Conference a success.

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## JEOL and IES prizes

In the long history of the RSC ESR Group, one of the best predictors of an excellent scientific career is the JEOL medal: many past winners are currently holding faculty posts at universities across the world. All student abstracts were considered for the short-list, the authors of the best six were invited to give a talk. It was very clear to the committee that the fine work by Leah R. Weiss on the dynamics of exchange coupled triplet excitons was the winner. The two runners-up were Katharina Keller and Melissa Van Landeghem. A representative of the JEOL Corporation presented the medal during the drinks reception, much appreciated by the attending students, that the company also sponsored.

The International EPR Society has traditionally presented two poster prizes during the Conference Dinner: Nino Wili was recognised for his work on chirped pulses in EPR, and Kaltum Abdiaziz was awarded the other prize for her poster on EPR electrochemistry.

## Committee

The following committee members have served their full term of office: Gunnar Jeschke, whose superhuman efficiency was commended; Chris Wedge, who was a brilliant Web Master; Andrew Gibbs, whose role in getting the Bruker Thesis Prize off the ground was noted with thanks; Fraser MacMillan ceased to be the Treasurer; Emma Richards was thanked for her role with a note that she will rotate back on the Committee soon as the Cardiff Conference organiser; Chris Timmel and Arzhang Ardavan received a standing ovation for the Oxford conference.

David Norman was elected to the Treasurer post; Olav Schiemann was elected International Representative; Chris Wedge was re-elected Web Master; Sylwia Kacprzak of Bruker Corporation was elected Industry Representative; Gavin Morley was elected Ordinary Committee Member.

## Next conference

Stephen Sproules is organising the next conference in Glasgow between 7<sup>th</sup> and 11<sup>th</sup> April 2019. See <http://www.esr-group.org/conferences/2019-conference-glasgow/> for further information.

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