

量子科学研究センターセミナー  
「 $\pi$  分子複雑性」TRA 講演会（共催）  
UEC 先端化学セミナー（共催）

量子科学研究センター  
Institute for Advanced Science



講演者 Dr. Sebastian Gorgon  
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講演題目 : **Radical chromophores as molecular spin-optical interfaces**

日時 : 9 月 30 日 (水) 16:00~17:30 場所 : 東 6 号館 803 会議室

### Biography

Dr. Sebastian Gorgon is a JSPS Postdoctoral Fellow with Prof. Nobuhiro Yanai at the University of Tokyo. He also holds a Research Fellowship at Emmanuel College in the University of Cambridge. He received his PhD under Prof. Sir Richard Friend at the Cavendish Laboratory, and a Boeing Quantum Creators Prize 2023. His work uses ultrafast spectroscopy and spin resonance to develop new functional materials.

### Abstract

Luminescent organic radicals have attractive properties for optoelectronic and spintronic applications. Substituted trityl radicals can show stable and efficient emission from a doublet ( $S = 1/2$ ) state. More complex spin states can form when suitable exchange coupling is engineered. Intermolecular exciton harvesting can improve stability and efficiency of radical near-infrared light emitting diodes.<sup>[1]</sup> In analogous intramolecular structures, near-infrared emission after populating a strongly exchange-coupled quartet state ( $S = 3/2$ ) can be achieved. These states enable both manipulations of coupled spins via microwaves and read-out using light at room temperature.<sup>[2,3]</sup> Light emission is even possible in systems that contain intrinsically non-luminescent radicals, enabled by Thermally Activated Delayed Fluorescence (TADF) units.<sup>[4]</sup> While previous studies were limited to bulk samples, I will also share our recent results on the miniaturization of functional radicals. This forms a crucial step towards their scaling for molecular quantum technologies.

[1] *Nat. Photon.* 18, 905-912 (2024). [2] *Nature* 620, 538-544 (2023).

[3] *Nat. Commun.* 17, 7203 (2026). [4] *Adv. Mater.* 37, 2501164 (2025).

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