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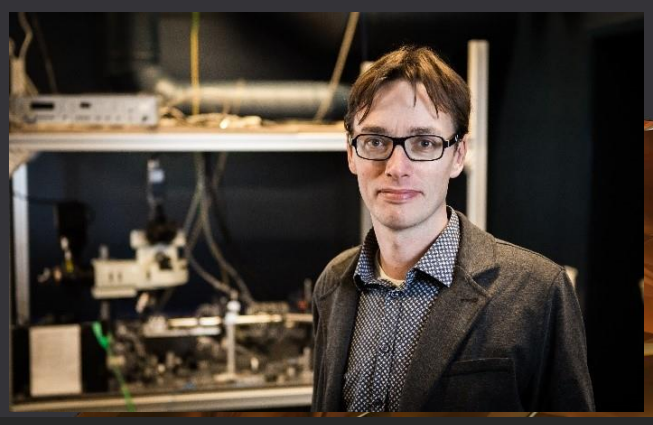

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"Quantum-Information Processing with Single-Photon Emitters"

Wednesday,
14 November 2018

12:00 refreshments
12:30 lecture

Wang Auditorium
The Dalia Maydan Building
Faculty of Materials Science and Engineering

RBNI Monthly Seminar Series 2018

TECHNION
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of Technology

Quantum-Information Processing with Single-Photon Emitters

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Semiconductor quantum dots have improved their optical performance dramatically in recent years, and today a clear pathway is laid out for constructing a deterministic and coherent photon-emitter interface by embedding quantum dots in photonic nanostructures [1]. Such an interface can be employed as an on-demand single-photon source for quantum-information applications, but more generally enables single-photon nonlinearities and deterministic quantum gates [2]. We will review the recent experimental progress on quantum dots coupled to nanophotonic waveguides and cavities as a mean to engineer light-matter interaction. We discuss current status on efficiency, coherence [3,4] and brightness [5], as well as the fundamental limits of photon indistinguishability [6,7]. Various potential quantum-information processing protocols are put forward that exploits the deterministic photon-emitter interface for single-photon nonlinear optics and spin physics. Finally, the experimental demonstration of a photonic switched controlled by a single spin coupled to a waveguide is discussed [8].

References

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[4] Thyrrestrup et al., Nano Letters 18, 1801 (2018)
[5] Daveau et al., Optica 4, 178 (2017).
[6] Tighineanu et al., Phys. Rev. Lett. 120, 257401 (2018).
[7] Dreessen et al., arXiv: 1806.05925.
[8] Javadi et al., Nature Nanotechnology 13, 398 (2018).