

SOLVAY COLLOQUIUM



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Information processing in prebiotic reaction networks

In life, the flow of information is as important as the flow of energy. Inspired by the unique ability of living systems to process information (in homeostasis, sensing, adaptation, growth) we are exploring routes to construct synthetic systems that capture some of the complexity of living systems.

Our focus is on complex networks of chemical reactions. We are familiar with the metabolic networks studied in biochemistry, and in recent decades many regularly recurring network motifs have been uncovered that are responsible for much of the functional behaviour in signalling or genetic networks. However, molecular 'circuits' are very delicate, and sensitive to changes in concentration, temperature, and so on. In this lecture, I will discuss strategies to 'synthesize' programmable reaction networks in microfluidic flow reactors, and how to use these networks as powerful reservoir computers.

Some relevant publications

- [1] S.N. Semenov, et al. *Nature Chemistry*, 2015, 7, 160-165
- [2] A.S.Y. Wong, et al. *J. Am. Chem. Soc.* 2017, 139, 8146-8151
- [3] te Brinke, et al. *Nature Nanotech.* 2018, 13, 849
- [4] Zheng, L. et al. *Nature Chemistry*, 2019, 11, 359-366
- [5] Robinson, et al. *Nature Chemistry* 2022, 14, 623-631
- [6] van Duppen, et al. *J. Am. Chem. Soc.* 2023, 145, 13, 7559-7568

Tuesday 14 November 2023 at 4:00 P.M.

COFFEE AND TEA WILL BE SERVED AT 3:45 P.M IN FRONT OF THE SOLVAY ROOM

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