

## Robert Raußendorf

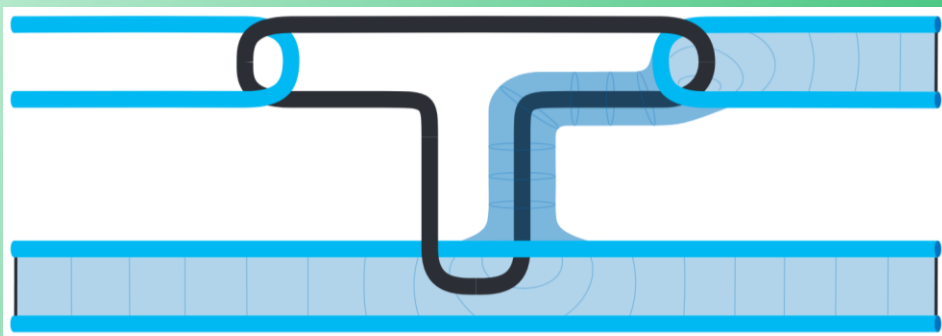
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### Computationally Universal Phases of Quantum Matter

In measurement based quantum computation, the computational power hinges on the resource quantum state. Some states give universal computational power, but most states provide no computational power at all [1]. This picture changes in the presence of symmetry. Namely, for phases of ground states of symmetric Hamiltonians, i.e., symmetry-protected topological (SPT) phases, it has been found that computational power is uniform across those phases. This observation gave rise to the term 'computational phases of quantum matter' [2,3]. In my talk, I give a short history of this line of research, and then present examples of symmetry protected quantum phases that have universal computational power [4 - 6].

Joint work with: Cihan Okay, Dong-Sheng Wang, David T. Stephen, and Hendrik Poulsen Nautrup

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- [2] A. C. Doherty and S. D. Bartlett, Phys. Rev. Lett. 103, 020506 (2009).
- [3] A. Miyake, Phys. Rev. Lett. 105, 040501 (2010).
- [4] R. Raussendorf et al., Phys. Rev. Lett. 122, 090501 (2019).
- [5] D.T. Stephen et al., Quantum 3, 142 (2019).
- [6] A.K. Daniel, R.N. Alexander, A. Miyake, Quantum 4, 228 (2020).



**Tuesday, 21.05.2024, at 16:30 h, HS C (Technik)**