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Towards an optimal quantum SWAP gate

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We present a novel approach that generalizes the well-known quantum SWAP gate to higher dimensions and construct a regular quantum gate composed entirely in terms of the generalized CNOT gate that cyclically permutes the states of d qudits, for d prime. We also investigate the case for d other than prime. A key feature of the construction design relates to the periodicity evaluation for a family of linear recurrences which we achieve by exploiting generating functions and their factorization over the complex reals.

Biography

Colin Wilmott received is PhD in Mathematics from Royal Holloway, University of London. Following this, he held a two-year Assistant Lectureship at University College Dublin, before going on to undertake a DFG-supported Postdoctoral Fellowship at Heinrich-Heine Universitaet Duesseldorf as well as a Marie Curie Fellowship at Masaryk University. He is also the recipient of one further Marie Curie Fellowship, but declined this offer to take up his present position as Senior Lecturer in Mathematics at Nottingham Trent University.

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