

HARVARD UNIVERSITY
17 Oxford Street
Cambridge, MA 02138



Tuesday, July 28, 2020, at 10:00 (Boston)
15:00 (UK/Eire) 16:00 (C.Europe) 22:00 (China)
Mathematical Picture Language Seminar
Zoom at: <https://harvard.zoom.us/j/779283357>

The representation theory of the Clifford group, with
applications in quantum information

David Gross, University of Cologne

Abstract: The Clifford group is the most important set of quantum circuits that allow for an efficient classical description. It therefore forms an integral part of many protocols in quantum information, and it turns out that their properties can often be described in terms of representation-theoretic data. Motivated by these connections, we start our analysis by establishing an analogue of Schur-Weyl duality. As is the case for SW-duality between $U(d)$ and S_t , the resulting description of the t^{th} tensor power of the n -qubit Clifford group is independent of the number n of qubits! This uniform theory implies that, maybe surprisingly, several tasks in quantum information theory can be performed with a system-size independent amount of resources. Examples include: Testing whether an unknown state is a stabilizer state, and constructing unitary designs with few non-Clifford gates. arXiv:2002.09524, 1906.07230, 1712.08628.

