

Abstract Submitted
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Regrouping phenomena of SIC POVMs covariant with respect to the Heisenberg–Weyl group¹ HUANGJUN ZHU, Centre for Quantum Technologies, National University of Singapore — Symmetric informationally complete positive operator valued measures (SIC POVMs) covariant with respect to the Heisenberg–Weyl (HW) group form disjoint orbits under the action of the normalizer of the HW group—the (extended) Clifford group. Additional SIC POVMs can be obtained by a suitable regrouping of the fiducial vectors on certain orbits, for example, in Hilbert spaces of dimension three, four, eight and twelve. To understand these SIC POVM regrouping phenomena, we need to go beyond the Clifford group and consider a larger group, in particular the normalizer of the Clifford group. We prove that, when the dimension of the Hilbert space is not a multiple of four, the HW group is a characteristic subgroup of the Clifford group, and the normalizer of the Clifford group is itself; when the dimension is a multiple of four, there are exactly two normal subgroups in the Clifford group that are isomorphic to the HW group, which are conjugated to each other in the normalizer of the Clifford group. Based on this observation, we provide a unified framework for understanding the regrouping phenomena mentioned above and those potential candidates.

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