Abstract Submitted
for the NEF20 Meeting of
The American Physical Society

Controlled not connectivity in the Clifford group REILLY RATCLIFFE, OSCAR PERDOMO, Central Connecticut State University — The Clifford group is the set of gates generated by CZ gates and the two local gates P = {{1,0},{0,i}}and H, the 2 by 2 Hadamard gate. It is known that, for a two qubit system, the Clifford group C_2 is a subgroup of order 92160 of the group of 4 by 4 unitary matrices. It is also known that the local Clifford gates LC_2 is a subgroup of order 4608 of the group C_2. In order to better understand the set C_2, we make two matrices U_1 and U_2 in C_2 equivalent if $U_1 = V U_2$ for some $V \in LC_2$. We show that this equivalence relation splits C_2 into 20 orbits, $O_1, \ldots, O_{20}$, each with 4608 elements. Moreover, for each orbit O_i, CZO_i intersects 9 different orbits $O_{i1}, \ldots, O_{i9}$ where O_{ij} does not equal O_i and with $CZO_i \cap O_{ij}$ containing 512 matrices for each $j = 1, 2, \ldots, 9$. The link https://www.youtube.com/watch?v=lcYtB2tnXFw leads you to a YouTube video that explains the most important results in this paper.

Reilly Ratcliffe
Central Connecticut State University

Date submitted: 28 Oct 2020 Electronic form version 1.4