Problems Day 4
PhD school: Vietri Sul Mare 2018

Problem 1: Action of single qubit gates on Pauli operators

Work out the action of the single qubit gates S, H, T on the Pauli operators X, Y, Z, e.g., $SXS^{-1} = Y$.

Problem 2: Single qubit Clifford gates and braiding

Show that $S = B_{12}$ and $H = iB_{12}B_{23}B_{12}$ with the braiding operator $B_{ij} = \exp\{\pi\gamma_i\gamma_j/4\}$.

Problem 3: CNOT

Compute the action of CNOT on the operators $\mathbf{1} \otimes Z$, $Z \otimes \mathbf{1}$, $\mathbf{1} \otimes X$, $X \otimes \mathbf{1}$.

Problem 4: State injection

Prove the state injection protocol for realizing T gates with a magic state ancilla.