Name: Paul Gustafson

Hidden subgroup problem for nilpotent groups of rank 2:

- Main paper: http://arxiv.org/abs/0707.1260
- HSP for extraspecial groups : https://arxiv.org/abs/quant-ph/0701235

Description. We would like, at the very least, to reformulate the HSP algorithm in of the main paper in a more accessible way. Once we better understand how the algorithm works, we will evaluate whether we can extend it to groups of higher nilpotency class before the paper deadline.

Computing the Unit Group Algorithm for Number Fields:

- Main paper: http://dl.acm.org/citation.cfm?id=2591860

Description. One of the main results of this paper is a solution to the continuous HSP for $\mathbf{R}^n$, where the definition of the HSP is modified to assume that the subgroup is a full-rank lattice and that the hiding function is Lipschitz, periodic on the lattice, and only hides the lattice approximately.

We would like to generalize their definition, and attempt to push their method of proof further. Lattices are also defined over locally compact topological groups. This setting may be too broad for a good definition, but we could restrict ourselves to, say, compact Lie groups, or even just try to apply it to a particular compact Lie group.

A Lattice Problem in Quantum NP:

- Main paper: https://arxiv.org/abs/quant-ph/0307220

Description. We would like to analyze the importance of positive definite functions in the context of the complexity class QMA. We will summarize the results of the main paper, and try to understand how if they can be used to generate solutions to lattice problems, not just verify them. To do this, we will consider the simplest possible lattice problems (in $\mathbf{R}^n$ for $n = 1, 2$).

Team partner: Qing Zhang