Contribution ID: **165** Type: **poster**

Implementing transferable annealing protocols on neutral atom quantum processors

In the quantum optimisation paradigm, variational quantum algorithms face challenges with hardware-specific and instance-dependent parameter tuning, which can lead to computational inefficiencies. However, the promising potential of parameter transferability across problem instances with similar local structures has been demonstrated in the context of the Quantum Approximate Optimisation Algorithm. In this paper, we build on these advancements by extending the concept to annealing-based protocols, employing Bayesian optimisation to design robust quasi-adiabatic schedules. Our study reveals that, for Maximum Independent Set problems on graph families with shared geometries, optimal parameters naturally concentrate, enabling efficient transfer from smaller to larger instances. Experimental results on the Orion Alpha platform validate the effectiveness of our approach, scaling to problems with up to 100 qubits. We apply this method to address a smart-charging optimisation problem on a real dataset. These findings highlight a scalable, resource-efficient path for hybrid optimisation strategies applicable in real-world scenarios.

Email Address of submitter

lucas.leclerc@pasqal.com

Short summary

This work combines theoretical, numerical and experimental results on a hybrid classical-quantum approach tackling industrial use cases with quantum optimisation on a neutral atom processor from the company Pasqal.

Author: LECLERC, Lucas (Pasqal)

Co-authors: Dr DALYAC, Constantin (Pasqal); Dr BENDOTTI, Pascale (EDF); Dr GRISET, Rodolphe (EDF); Dr MIKAEL, Joseph (EDF); Dr HENRIET, Loic (Pasqal)

Presenter: LECLERC, Lucas (Pasqal)

Session Classification: Networking cocktail and Poster Session