Phase I Feedback Sheet

TeamID: 12480
HotCRP Submission #: 103
Submission Type: New Application
Team Name: Snowdrop

This sheet contains yes and no answers corresponding to the judging guiding questions based on the submission type.

Field	Value
Does the submission provide a clear, concise description of the problem framed as a precise computational problem that plausibly encompasses at least one specific real-world societally beneficial use case?	Yes
Does the submission provide plausible arguments that the specific computational problem being posed is, in fact, a bottleneck or a particular challenge that is obstructing progress towards a socially beneficial application.	No
Does the submission make a plausible and well-reasoned case that the proposed improvement over the current state of the art is both valuable and plausibly achievable?	Yes
Does the proposed quantum solution demonstrate more than a quadratic speedup over classical methods? If not, did the team provide an exceptionally compelling case for practical quantum advantage supported by strong scientific evidence?	Yes
Did the team explicitly state the asymptotic scaling of their quantum approach (i.e., how the execution time of the algorithm scales with problem size) in terms of resource requirements, and clearly describe the quantum architecture or model they intend their algorithm to be implemented in? In particular, did they describe (as applicable): • Gate complexity and/or circuit depth (for Digital NISQ or FTQC models) • Space complexity (number of logical qubits and logical ancilla required) • Annealing time and scaling behavior (for Adiabatic/Quantum Annealing) • Hamiltonian evolution time and system parameters (for Analog Simulators & Continuous Variable QC) • Quantum-classical iteration complexity (for Hybrid Quantum-Classical approaches) • Number of times the quantum circuit or analog evolution must be repeated • Other relevant asymptotic runtime and complexity metrics based on the specific quantum model used, if not covered above Asymptotic scaling should attempt to quantify total end-to-end resources required (including data loading) as opposed to only looking at query complexity (e.g. QRAM executions). Generally speaking, the tighter the bounds on the scaling, the better.	No

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Did the team support their asymptotic scaling claim (i.e., how computational resource requirements grow with problem size) with rigorous proofs, numerical evidence, or heuristic arguments? If they relied on numerical evidence or heuristic arguments, does it scale to problem-relevant sizes?	No
Did the team make an earnest attempt to quantify the computational resources of the best classical algorithms for solving the problem and relate that to the expected quantum speedup? • If strong classical results exist, did the team reference well-established classical algorithms and provide a meaningful comparison to their quantum approach? • If strong classical results do not exist, did the team attempt to propose a serious classical attack on the problem?	Yes
Did the team provide information about all relevant system parameters impacting performance, including any required approximations, and a clear breakdown of how runtime scales with those parameters—such as basis size, system size, error tolerance, or evolution time—as relevant to their quantum approach? If approximations are required (or an approximation ratio is the goal), did the team quantify quantum advantage in terms of both problem size and approximation parameters?	Yes
Does the submission demonstrate clear innovation and meaningful improvement over known methods by applying an existing quantum algorithm to a previously unexplored real-world application, creating a significant "thought delta"?	Yes
Does the submission propose a quantum method that demonstrates broad applicability across multiple problem domains, rather than being limited to solving a single specific problem?	Yes
If the method is general, does the submission include specific, practical examples of how it can be applied to real-world challenges to clearly illustrate its utility and impact?	Yes
If the asymptotic scaling relies on a mathematical conjecture, is it a widely accepted conjecture rather than speculative or weakly justified?	No
Has the team made an initial effort to identify and describe the constant factors associated with the best known classical algorithms for the problem they are targeting? Or alternatively, have they identified the point at which the problem becomes classically intractable in practice?	No

Field	Value
Has the team begun defining the constant factor quantum resources necessary for their approach, including early estimations of relevant resource requirements (e.g., where applicable, gate count, circuit depth, qubit count, annealing time, Hamiltonian parameters) to assess how quantum solution might perform on realistic quantum architectures? This is in addition to the required asymptotic scaling analysis.	No