



USRA Q2B Applied NISQ Computing Award

1.0 BACKGROUND

The Universities Space Research Association (USRA) is collaborating with QC Ware and (QCW), and New York State Technology Enterprise Corporation (NYSTEC), to explore the short-term and long-term benefits of new optimization, machine learning and quantum simulation algorithms designed to run on hybrid quantum-classical computing machinery.

This award is aimed at highlighting recent papers in the field of Applied Noisy Intermediate Scale Quantum computing (ANISQC). The award is specifically focused on papers impacting the field of near-term quantum computing, exclusively algorithms and experiments that advance the field of applied quantum computing in existing hardware, or theoretical/engineering advances tightly connected to experimental realization in the near term. A digest of pre-prints of papers in this area is maintained at <https://riacs.usra.edu/quantum/nisqc-nl> and it is indicative of the theme of the papers that we expect as submissions (i.e. works describing experiments or algorithms in optimization, machine learning, quantum or classical simulation).

2.0 OVERVIEW

The Universities Space Research Association (USRA) is pleased to invite proposals that highlight the work from papers (pre-print or published) since Jan 1, 2020 that are focused on ANISQC experiments or algorithms that can be applied to advance the state-of-the-art in optimization, machine learning, quantum or classical simulation. One proposal will be awarded an invitation to present their paper at Q2B 2020 as well as a selection between a prize of up to \$5000 credit on QC Ware's Forge platform or up to \$2500 credit on an available quantum computing platform of a Q2B sponsor (gold or above), based on the awardees' preference. Each proposal will be reviewed by a panel of researchers in quantum computing.

The call is open to all qualified researchers affiliated to accredited universities and not-for-profit organizations internationally from countries that do not fall under U.S. export control restrictions (**PROPOSERS**). The computer time will be provided free of charge. No financial support is offered for the completion of the project.

For detailed information and application instructions, visit the USRA Quantum Information Technology website at <https://riacs.usra.edu/quantum/ANISQCAward>.

3.0 PROPOSAL PREPARATION AND SUBMISSION REQUIREMENTS

Proposals should be as thorough and detailed as possible so that reviewers may properly evaluate your ANISQC paper and the potential impact of the work. The proposal will consist of a research paper that is posted on the ArXiv and/or on an open-access peer-reviewed academic journal during the eligibility period (Jan 1, 2020-October 31, 2020), plus a brief synopsis/cover letter (max 2 pages,



12pt font, figures allowed) describing the potential impact of the work to a key problem in future applications of quantum computers in one applied commercial sector. The synopsis will be submitted together with the research paper and will be shared only with reviewers and sponsors. Note that the synopsis can include content that overlaps with the content of the paper. A good synopsis will need to answer the following questions:

- (a) Describe one or more key problems in a commercial sector such as finance, pharmaceuticals, materials research or industrial operations. What is the estimated economic and/or social impact of solving this problem? What are the key challenges/limits faced by current approaches that address this problem?
- (b) Describe how the methods described in your paper could be applied to this problem. What would you hope to improve or to discover that would make your method competitive or advantageous with respect to the state-of-art? If your paper does not discuss a specific implementation, describe key features and resource requirements that a NISQ computer would require to use this method in practice in one or more of the current architectures.

Ownership of Proposal Data

Ownership of all data, materials and documentation originated and prepared for **USRA** pursuant to the RFP shall belong exclusively to the proposer. **PROPOSER** grants to **USRA** the right to disseminate and reproduce the research paper, as well as the presentations that are produced as a result of the possible award, in totality or in part without limitations. Trade secrets or proprietary information submitted by **PROPOSER** shall not be subject to public disclosure; however, **PROPOSER** must invoke the protection, in writing, either before or at the time the data is submitted in order to request confidential treatment of such information.

The written notice must specifically identify the data or materials to be protected and state the reasons why protection is necessary. The proprietary or trade secret material submitted must be identified by some distinct and conspicuous method such as highlighting or underlining and must indicated only the specific words, figures, or paragraphs that constitute trade secret or proprietary information. The classification of an entire proposal document as proprietary or trade secret is not acceptable.

Deadline for Submission

Proposals should be submitted starting immediately for full consideration in the first set of proposal selections for this Cycle. The call for proposals will remain open through ~~November 13, 2020~~ **November 20, 2020**. Proposals must be submitted online at <https://riacs.usra.edu/quantum/ANISQCAward>. Scientific Questions about this RFP can be directed to the USRA Associate Director for Quantum Computing, Dr. Davide Venturelli (dventurelli@usra.edu). Contractual questions can be directed to **USRA** Contracts Manager, Elena Einstein (eeinstein@usra.edu).

4.0 EVALUATION AND AWARD CRITERIA



Proposals submitted in response to this Call will be evaluated in a competitive peer review. The peer review panel, including its chair, will be recruited from the academic, government or commercial research community.

Based on the results of the peer review, a recommendation for the total program will be submitted to a selection committee chaired by USRA with representation from sponsors of the program who will make the final proposal selection.

The following factors will be used in evaluating proposals for the ANISQC award

1. The overall scientific merit of the research paper (75% of the score).
2. The relevance of the scientific objective for advancing the knowledge on quantum computing for practical applications on one of the ANISQC domain area (finance, pharmaceuticals, materials and industry) as described in the synopsis (25% of the score).

4.0 ELIGIBILITY

Submission of papers from authors including researchers from international academic institutions and non-profits unaffiliated with program sponsors from countries that do not fall under U.S. export control restrictions are eligible to participate. Papers with co-authors from USRA, QC Ware or sponsors are ineligible.

5.0 SPECIFIC PROPOSAL CONSIDERATION

Education and Public Outreach (E&PO)

USRA reserves the option to promote briefly the project objectives and investigators on related websites and during E&PO initiatives, as well as inviting the project representatives to selected events. Upon completion of the research project and publication of the results, selected projects may be contacted by USRA to collaborate in designing an E&PO program meant to diffuse the results of the investigation.

6.0 AWARD

USRA may cancel this Request for Proposals or reject proposals at any time and is not required to furnish a statement of the reason why a particular proposal was not deemed to be the most advantageous.

Generally, intellectual property developed through research using the quantum computer will be retained by those conducting the research, subject to each individual's employer's intellectual property policies.

PROPOSER shall have the right to publish results of its research in any publication, provided that **PROPOSER** shall acknowledge the sponsors of this award (USRA, QCW, NYSTEC), and whenever possible, give credit to **USRA** in published reports regarding the research.



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7.0 REPORTING AND DELIVERY REQUIREMENTS

Awardees will be required to present their research paper at Q2B 2020. A short, confidential report illustrating output of the research using computer time toward the commercial problem and list of publications and/or software that resulted from the award will be due within 12 months after the award.