

Proposal Panel 1 : 2152988

[Back to Proposal](#)

Agency Name:

National Science Foundation

Agency Tracking Number:

2152988

Panel Summary

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The proposed work will focus on developing the open source package QMCPy, which is a QMC software implemented in Python, along with addressing methodological and theoretical issues associated with QMC. The proposed methods will be applied to two important applications: big data analysis and expensive Bayesian modelling. If successful, the project will provide computational tools for dealing with big-data challenges.

Intellectual Merit:

+ Strengths

(1) QMC uses low discrepancy sampling and enjoys better theoretical convergence and practical performance properties than standard Monte Carlo (MC) simulations. The proposal's study on increasing their convergence rates and overall performance from both theoretical and implementation perspectives could advance the area.

(2) The LD sequence generators including higher-order digital sequence will be implemented in the package. These generators are not yet available in popular libraries.

(3) The team has enough prior experience in QMC and a software package to build on. The software will provide user-friendly interface for interfacing with other libraries such as SciPy, TensorFlow.

- Weaknesses

(1) The proposal orients heavily towards the development of a software rather than theoretical research. The panel felt that the proposal can be stronger if a compelling argument of mathematical/statistical innovation of the proposed work can be clearly made.

(2) A more detailed plan on how the software will be created and maintained is critical to the proposal.

(3) More preliminary results in deep learning would have strengthened the proposal.

(4) A more thorough discussion of advances in the field that contextualizes the proposed work and its limitation would have improved the proposal.

(5) The panel would have liked to see more novel advances of the proposed methods over existing approaches that are available in the literature.

Broader Impacts:

+ Strengths

(1) The team has a good track record in mentoring students. Graduate and undergraduate students will be trained on how to write clean code efficiently.

(2) This proposal will grow an open source python software library, increasing access for practitioners, and accelerating adoption in new application areas.

(3) The PIs will make efforts to attract students from underrepresented groups. The work will be presented at conferences.

(4) Implementation of the open source QMC software could provide research groups an easy-to-use platform for testing new ideas.

- Weaknesses

(1) specific plans of recruiting and supporting students from underrepresented groups can strengthen the proposal.

(2) The educational component of the proposal focuses on the software development. It would be nice to see elements in advancing students' theoretical understandings of aspects of the proposed work.

Results of Prior NSF Support: The PIs have prior NSF support. There are many publications and the PIs have supported students.

Postdoctoral Mentoring Plan: N/A

Data Management Plan: adequate

RECOMMENDATION: The proposed project of developing an open source package QMCPy is an important and interesting work. However there was a lack of enough theoretical underpinnings and it was unclear how the proposed work would advance mathematics or statistics.

The panel placed this proposal in the category: Not Recommended for Funding

This summary was read by/to the panel and the panel concurred that the summary accurately reflects the panel discussion.

PANEL RECOMMENDATION: Not Recommended for Funding



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