Proposal Review 4 : 2053714

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Agency Name:	National Science Foundation
Agency Tracking Number:	**2053714**
Organization:	
NSF Program:	CDS&E-MSS
PI/PD:	Hickernell, Fred
Application Title:	Collaborative Research: Quasi-Monte Carlo Community Software
Rating:	Fair

Review

Summary

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

The proposal plans to grow the existing software package QMCpy, a quasi Monte-Carlo python software library. Several existing approaches and applications will be implemented. If successful, QMCpy is potentially useful for the QMC community and beyond.

Strengths:

+ QMCpy is already in place and the PIs have worked on various aspects of QMC.
+ Most latest developments in QMC community will be implemented/added to QMCpy and will be made available to broader communtities
+ QMCpy seems to have strong supports from academia (Stanford and Warwick) and industry (SigOpt) through collaborative letters.

Weaknesses:
- The proposal focuses on implementing available methods. Most, if not all places, tasks are simply with one sentence "we will implement...". Challenges, and hence innovations must be made, etc to carry out the implementations are not discussed. The proposal would be much stronger if these aspects have been detailed/identified and approach to overcome.

- Other more descriptive tasks, such as in Section 3.1: "implement some numerical optimization algorithms for constructing low discrepancy designs" lack details, which makes the actual work uncertain. Other examples are "we will implement LD sequences taking advantage of multiple cores of the same CPU. We will also explore the possibility of GPU implementations", and "We will strengthen QMCPy's rudimentary MLQMC, including extending the theory and implementation of the single level stopping criteria developed by PI FH, SCTC, and their collaborators [45, 47, 49, 56, 59] to the multilevel case."
As a consequence, it is not clear what the actual tasks will be taken and how to assess their success.
- The proposal would have been stronger had the PIs provided the history of downloads, the number of users, etc of the current QMCpy package.

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

Strengths:
+ The PIs are known in the communities and the PIs have made effort to reach out the user communities via tutorial, talks, etc.

Weaknesses:
- Since this is a software proposal, details on deliverables, delivery mechanism and community usage metrics should have been discussed in details.
- Sustainability, especially beyond the life of the project, is not discussed.

Please evaluate the strengths and
weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if
applicable

Summary Statement

The idea of collecting on the implementations of well-established algorithms and latest algorithms in one community software is important for the appropriate communities. The PIs are qualified to achieve such a task. Details on the actual tasks, their challenges, innovations, etc would have made the proposal competitive.