Proposal Review 2 : 2152988

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Agency Name:	National Science Foundation
Agency Tracking Number:	**2152988**
Organization:	
NSF Program:	CDS&E-MSS
PI/PD:	Hickernell, Fred
Application Title:	Collaborative Research: Quasi-Monte Carlo for Efficient Simulation
Rating:	Very Good

Review

Summary

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

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

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

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Summary Statement

This proposal considers quasi-Monte Carlo (QMC) simulations. QMC is known as low discrepancy sampling that enjoys better theoretical convergence and practical performance properties than Monte Carlo (MC) simulations (based on identically distributed sampling). Both MC and QMC are widely used in practical applications. The PIs intend to develop an open-source QMC Python software library. They also plan to investigate variation/variance reduction methods, automatic stopping criteria, big data subsampling methods, and low-discrepancy Bayesian sampling in QMC.

Broader impacts have strength in software package development for the QMC community and the broader scientific community.

This is a very solid proposal. It is timely to develop the proposed open-source QMC Python software library that will have big impact on the QMC community. It is important to investigate the proposed theoretical and methodological problems on QMC, and the PIs will likely produce interesting results. Giving that QMC has been extensively investigated over the years, it is reasonable to expect that the QMC Python software library will be more significant than the theoretical part particularly in terms of research impact on the QMC or even broader scientific community. The proposal is ranked among the middle third of the proposals that I reviewed for this panel.