

Proposal: 1955092

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Agency

Agency Name: National Science Foundation

Application

Agency Tracking Number: **1955092**

Project Title: Combinatorial Tools in Representation Theory

Requested Amount: \$351,547

Received Date: 09/27/2019

PI/PD: Nathan Williams

Authorized Representative: Simon Butcher

Submitting Institution: University of Texas at Dallas

SAM Legal Business Name: UNIVERSITY OF TEXAS AT DALLAS

Program

Program Title: Combinatorics

Program Code: 7970

Funding Opportunity Number: PD 18-7970

Division/Area of Science: Division Of Mathematical Sciences

Program Contact Name: Tomek Bartoszynski

Program Contact Phone: (703) 292-4885

Program Contact Email: tbartosz@nsf.gov

Application Status History

Status	Status Date
Declined	03/20/2020

Cognizant Program Officer Comments

Dear Professor Williams,

The evaluation of your proposal in the Combinatorics program has been finalized and I regretfully will be recommending your proposal for declination. Although a worthy proposal, it suffered from comparison to other proposals within a pool of very strong proposals.

Tomek Bartoszynski

These comments are the review analysis I prepared in support of my recommendation for this proposal, with information deleted that is purely administrative or that might identify reviewers or investigators who are not involved in this proposal.

Review Analysis

Principal Investigator: Williams, Nathan
 Proposal Number: DMS - 1955092
 Institution: University of Texas at Dallas
 Title: Combinatorial Tools in Representation Theory

Review Analysis:

This proposal was considered by a panel on algebraic combinatorics and related areas. The panel consisted of 13 members whose research specialties covered the aforementioned areas. The panel was conducted and observed by NSF program officers from the Probability, Combinatorics and Foundations programs.

Each proposal was assigned to three or more panelists for review before the panel met, and in some cases additional panelists contributed reviews while the panel was under way. The reviews formed the starting point for a panel discussion in which other panelists in addition to the three reviewers participated. Comparisons between proposals took place in these discussions and are reflected in the panel summary. Both intellectual merit and broader impacts were taken into account by the panel in their placement of a proposal.

The panel sorted the proposals under consideration into a ranked set of equivalence classes that informs the NSF of the panel's assessment of priority for funding within this competition. In some cases additional reviews from other specialists and/or panels were obtained.

DMS program officers asked the panel to sort proposals into four groups (Highly Recommended for Funding, Recommended for Funding if Possible, Not Recommended for Funding, and Not Discussed by the Panel) and to rank the Recommended for Funding if Possible group in detail. At the start of the panel certain proposals were placed in the Not Discussed by the Panel category, since the panel was satisfied with the reviewers' assessments and concurred that those proposals were not competitive in this year's competition. This category consisted of a subset of proposals with an average rating of G or below, and forms a subset of the Not Recommended for Funding category. Historical funding rates and our estimates of the funds available led us set the sizes of the appropriate groups to be 10%, 30% and 60% of the proposals submitted. Most of the proposals placed by the panel in the Not Recommended for Funding category will be recommended for declination. Many of the Fund if Possible category proposals will also be recommended for declination.

This is a proposal in algebraic combinatorics. More specifically, the PI is interested in representation theoretic and/or combinatorial explanations of positivity.

Three panel reviewers gave this project ratings of V, V and V/G.
 The proposal is divided into three parts:

1. coinvariant rings of complex reflection groups and combinatorial statistics
2. diagonal coinvariants,
3. Macdonald polynomials.

Proposal presents a number of interesting questions and plans to approach them grounded in PI's past work and methods. There is a good mix of problems of varying difficulty. On the negative side, some reviewers indicate that for some harder problems it is less clear if the methods proposed by the PI are feasible, and the whole panel echoes this concern.

The broader impact aspects of the proposal are very good. The PI advises two graduate students, organizes conferences, mentors REU students and teaches reading courses. He is organizing a workshop at BIRS in 2020 following a successful workshop at AIM five years earlier.

Overall, this is a strong proposal that ought to be given a serious consideration. However, the competition in the Combinatorics program was very strong this year and, in the end, the panel felt that this project had lower priority for support than many competing submissions and placed it in the "Not Recommended for Funding" category. I regretfully concur with this recommendation.

Recommendation: Declination.

Tomek Bartoszynski
 Probability, Combinatorics and Foundations

Review Information

Please note: The Sponsored Projects Office (or equivalent) at the submitting organization is NOT given the capability to read the below review information.

Panel Summary

Panel Summary	Release Date
Panel Summary #1	02/21/2020

Proposal Review [Summary of All Reviews](#)

Review	Release Date
Proposal Review #3	02/21/2020
Proposal Review #2	02/21/2020
Proposal Review #1	02/21/2020

Context Statement

Probability, Combinatorics, and Foundations mega-Program
 Proposal Review Context Statement for Fiscal Year 2020

In 2020 the Division of Mathematical Sciences' mega-program in Probability, Combinatorics, and Foundations (PCF) received over 250 research proposals. In addition, all three programs received several conference proposals and supplements requests. Most of these proposals were reviewed by one or more of the five panels run by the mega-program; two in Combinatorics, two in Probability, and one in the Foundations program. Some proposals were evaluated by panels in other programs (within the division), and a number of proposals submitted to other programs in DMS, were reviewed by one of the PCF panels. Of the remainder, the CAREER, FRGMS, and RTG proposals were reviewed by division-wide panels, and most of the conference and supplement proposals were reviewed internally. This year, the PCF mega-program expects to recommend support for less than one-third of competing proposals. A small number of submissions were reviewed exclusively by mail.

In the case of a panel review, typically three members of the panel submitted independent reviews prior to the panel's discussion of the proposal. A fourth panelist then wrote a summary. Sometimes, a proposal was reviewed by more than one panel or a combination of panel and mail reviews. Copies of all reviews used in the decision-making process are made available to the PI in FastLane.

Recommendations for particular proposals are often difficult to make and factors other than reviewers' comments and ratings enter into them. Appropriate balance among subfields, between new investigators and those previously supported, contribution to initiatives and interdisciplinary efforts, effect on education and human resource development, the total amount of funds available, and NSF policies are other important factors taken into consideration. Sometimes, revised versions of proposals declined one year are awarded the following year, and often research that has been supported for multiple funding cycles is declined as other, more competitive, proposals enter the competition.

Whereas reviewers' ratings are taken into consideration, the final recommendation is not based on a simple average of the ratings, and the merit of each proposal is based on the content of the reviews and the panel summary or panel summaries. Among other things, program directors look for reviewers' perspectives on the intellectual merit and broader impacts of the proposed research. The comments of each reviewer are considered in the context of other reviews written by the same reviewer. In other words, every attempt is made to develop a clear picture of each proposal's strengths and likely impact.

Among other things that reviewers look for in a successful proposal are the formulation of a problem or problems and an approach to their solution, clear exposition in the summary and project description, a conveyed sense that the research can be accomplished, and a vision of what the completion of the research might mean. To facilitate the evaluation process, proposals need to be written with the reviewer in mind, so that the importance of the proposed activity can be readily understood in a broad mathematical context.

The decision to fund a proposal is usually accompanied by high ratings, although sometimes proposals in risky new areas or proposals having potentially transformative ideas are funded even when they are not given the highest marks. Many meritorious proposals will not be recommended for awards. A decision to decline or to award a proposal should not be construed as a statement by either the NSF or by the program about the absolute quality of the proposed research. Taken collectively, the funded proposals present a balance across the active and essential areas of the discipline and are not identified by a simple ordering of proposals.

FY20 Program Directors in PCF,

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