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Proposal: 1855608

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Agency
Agency Name: National Science Foundation

Application
Agency Tracking Number: **1855608**

Project Title: Geometry of Braid Groups in Combinatorics

Requested Amount: \$246,516

Received Date: 09/24/2018

PI/PD: Nathan Williams

Authorized Representative: Wendy Mcdonald

Submitting Institution: 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: Stefaan De Winter

Program Contact Phone: (703) 292-2599

Program Contact Email: sgdewint@nsf.gov

Application Status History

Status	Status Date
Declined	08/06/2019

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 the declination of your proposal.

Despite some criticisms, many on the panel, as well as the combinatorics program, feel that good potential is present in your proposal. Therefore I would like to strongly encourage you to resubmit a carefully rewritten proposal in a future competition.

Stefaan De Winter

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 F.

Proposal Number: DMS 1855608

Institution: University of Texas at Dallas

Title: Geometry of Braid Groups in Combinatorics

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; it evaluated 57 proposals. 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 three groups (Highly Recommended for Funding, Recommended for Funding if Possible, and Not Recommended for Funding) and to rank the middle group in detail. 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 it makes connections between Catalan-Coxeter combinatorics and the study of braid groups through topological techniques.

Three panel reviewers gave this project ratings of V/G, G, and V/G. Panelists agreed that the PI has done some very good work in the recent past and is building a strong track record. The panel appreciated the motivation for the current proposal as well as its ultimate goals. However, a recurring criticism was that the proposal was lacking in specifics, it was especially felt that more details on intermediate problems should be provided. Another criticism was that the proposal was very narrowly focused. Especially given the PI's broad background, panelists felt that the PI had missed the opportunity to develop connections of the proposed research to other parts of algebraic combinatorics.

The broader impact aspects of the proposal were viewed as excellent for an early career researcher. The PI mentors both undergraduate and graduate students. The PI is actively organizing conferences and has appeared as a mathematical consultant in a televised report on the NCAA basketball bracket. A future project includes establishing an AWM chapter at UT Dallas.

In view of the above described panel discussion the panel felt that this proposal was not competitive in this year's competition that saw several truly outstanding proposals. In the end this proposal was placed in the "Not Recommended for Funding" category. I concur the placement of this proposal.

Recommendation: Declination.

Stefaan De Winter
Program Director
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	05/28/2019

Proposal Review

Summary of All Reviews

Review	Release Date
Proposal Review #3	05/28/2019
Proposal Review #2	05/28/2019
Proposal Review #1	05/28/2019

Context Statement

Probability, Combinatorics, and Foundations mega-Program
Proposal Review Context Statement for Fiscal Year 2019

In 2019 the Division of Mathematical Sciences' mega-program in Probability, Combinatorics, and Foundations (PCF) received approximately 251 research proposals; 86 in Probability, 120 in Combinatorics and 45 in Foundations. In addition, all three programs received approximately thirty conference proposals. 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 20 conference 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.

FY19 Program Directors in PCF,

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