Proposal: 2334185

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Agency

Agency Name:	National Science Foundation

Application

Agency Tracking Number:	**2334185**
Project Title:	SBIR Phase II: A Novel Dense Fiber Array for Astronomical Spectroscopy
Requested Amount:	$1,000,000
Received Date:	06/24/2023
PI/PD:	Kevan Hashemi
Authorized Representative:	Kevan S Hashemi
Submitting Institution:	OPEN SOURCE INSTRUMENTS INC.
SAM Legal Business Name:	OPEN SOURCE INSTRUMENTS INC

Program

Program Title:	SBIR Phase II
Program Code:	5373
Funding Opportunity Number:	NSF 23-516
Division/Area of Science:	Translational Impacts
Program Contact Name:	Anna Brady
Program Contact Phone:	(703) 292-7077
Program Contact Email:	abrady@nsf.gov

Application Status History

Status	Status Date
Declined	12/20/2023

Cognizant Program Officer Comments

The reviews and panel summary capture all the relevant reasons for the recommendation. Having read through the proposal and review documentation, I concur with the panel's assessment.

Based on the concerns documented in the reviews and the panel summary, I recommend that this proposal be declined.

If the PI has questions or would like additional information regarding their proposal, they should feel free to contact the program after receiving this notice and taking sufficient time to read and carefully consider the individual reviews and/or panel summary.

Anna Brady
SBIR/STTR Program

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	11/06/2023

Proposal Review Summary of All Reviews

Review	Release Date
Proposal Review #3	12/14/2023
Proposal Review #2	11/06/2023
Proposal Review #1	11/06/2023

Process Statement

All proposals submitted to NSF are reviewed according to the two merit review criteria - intellectual merit and broader impacts - as described in the *NSF Proposal & Award Policies & Procedures Guide*. If a proposal is submitted to a specific program solicitation, additional review criteria may also have been used in the merit review of the proposal. Any additional review criteria used in the evaluation of a proposal would be described in the program solicitation to which the proposal was submitted. If the proposal was submitted in response to a funding opportunity that involved both NSF and one or more external funding organizations, then NSF staff may consult with those external organizations before finalizing a recommendation.

Your proposal received an external review, either by *ad hoc* reviewers only, by panel only, or by a mix of *ad hoc* and panel reviews. Some proposals may be considered by more than one panel. Reviewers have knowledge of the science and engineering subfields involved in the proposal as well as potential applications when relevant. The reviewers' fields of specialty are usually complementary within a reviewer group. Sometimes, reviewers with a broader scientific, technical, or management expertise are required for proposals involving substantial size or complexity, partnerships, broad multidisciplinary content, or significant national or international implications.

When a panel is used, individual reviewers, who may be panelists or *ad hoc* reviewers, are usually asked to submit written reviews to inform the panel discussions. If, after a panel has discussed a proposal, the Program Officer believes that additional expert advice would be helpful, they may request post-panel *ad hoc* reviews. During a panel meeting, written summaries of the panel's discussions of proposals are prepared. These summaries are brief synopses of the salient points emerging from the panel's discussion of each proposal, as they relate to the NSF and solicitation-specific review criteria. Copies of all the reviews and panel summaries used in the decision-making process for your proposal are available to you and your co-Principal Investigator(s), if any, on the Research.gov "Proposal Status" screen.

When a panel is used, the panel usually has an opportunity to categorize proposals with respect to their degree of competitiveness or priority for funding. Panels may decide that the written reviews capture all the salient points and that no further discussion by the panel is warranted; in those cases a panel summary may not be provided.

Panelists and Program Officers with certain conflicts of interest are disqualified from either serving as a reviewer or otherwise participating in the review process. Panelists or Program Officers with conflicts of interest that do not require disqualification are asked to leave the meeting room while the proposal that contains the conflict is discussed and do not otherwise participate in any funding recommendations for that proposal. Any written review received from a reviewer who is identified as having a conflict of interest is not used in the review process.

In reading the reviews, please keep in mind that the reviews are addressed to NSF staff, and not necessarily to you, the Principal Investigator. Occasionally, reviews may contain irrelevant, non- substantive, erroneous or ad hominem statements. The review panel and the Program Officers disregard such statements in arriving at a recommendation for the proposal.

External reviews are advisory; NSF makes the decision to Award or Decline, or in the case of preliminary proposals, to Invite/Not Invite or Encourage/Discourage. While many projects warrant funding, budget limitations necessitate that many of these be declined. In the difficult decision-making process, Program Officers consider the relative strength of each project as well as other factors, such as award balance among sub-disciplines, geographic distribution, types of organizations, and the potential contribution of each award to broadening the participation of individuals from groups traditionally underrepresented in science, technology, engineering and mathematics.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director/Office Head/Office Director or their designee whether the proposal should be declined or recommended for an award (or Invite/Not Invite or Encourage/Discourage in the case of a preliminary proposal). Normally, final programmatic approval is at the division/office level; large or complex awards may receive additional levels of review. Because of the large volume of proposals, this review and consideration process may take six months or longer. Large proposals, particularly complex proposals, or proposals in programs involving external partnerships may require additional review and processing time. Information on funding rates for all NSF divisions can be found at https://dellweb.bfa.nsf.gov.

NSF allows resubmission of substantially revised proposals as described in the *NSF Proposal & Award Policies & Procedures Guide*, but encourages investigators to seek the advice of the Program Officer before resubmissions are prepared. Some program solicitations impose restrictions on the timing of resubmissions. Investigators should be aware that the Foundation will treat the revised proposal as a new proposal that will be subject to the standard review procedures.

Information about reconsideration of declined proposals is found in the *NSF Proposal & Award Policies & Procedures Guide*. If you have questions regarding the review of your proposal, please contact the Program Officer who managed your proposal. Contact information is available on Research.gov.

Proposal Panel 1 : 2334185

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Agency Name: National Science Foundation

Agency Tracking Number: **2334185**

Panel Summary

Panel Summary

What is the intellectual merit of the proposed activity?

This SBIR project proposes to developA Novel Fiber Array to benefit Astronomical Spectroscopy and enhance the astronomical analysis capabilities of existing telescopes. This technology also has the benefit of having an ease of installation and manufacturer that can disrupt the market.

What are the broader impacts of the proposed activity?

The broader impact of the proposed project will be the ability to have detailed astronomical analysis performed with existing equipment. This should lead to a better understanding of the universe and aid with space discovery and exploration.

What is the commercial potential of the proposed project?

The potential commercial impact of this project could be significant in the telescope market. The potential product shows an advantage of installation, manufacturing, and maintenance that may move customers over to it.

Strengths:

+Novel approach to using nano adjustment to align fiber to individual astrological objects.
+Can handle multiple spectrum at once
+Tech exists but they can deal in thousands of objects
Reduce the cost associated with telescope operation and retrofit
+Approach - they have a feedback camera that will tell where the fibers are pointed and gives feedback on where the fibers are moving and give feedback to move
+Deploying a black box - technologies that can do this today are very invasive hard to install this is an attachment without a hard installation possess
+The team and partners are highly qualified.
+Implementing a smaller version - good tipping off point for Phase 2
+MRL and tech implementation is well taken

Weaknesses:

-Prototype with serious complexity, but if you go to thousands in the future how are you going to manage this? Heavy handholding at the individual fiber

level
-Astronomy is definitely improved, but where is the broader approach?
-The telescope market is a small market. How can this be viable? Revenue concerns?
-Need to fight against giants - this could be challenging
- Lack of visibility into adjacent markets may lead the design to be limited
- The disruption is clear, however is the market worth disrupting?

The panel assigned the following overall ranking to this proposal: Not Competitive

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

PANEL RECOMMENDATION: Not Competitive

Proposal Review 1 : 2334185

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Agency Name:	National Science Foundation
Agency Tracking Number:	**2334185**
Organization:	
NSF Program:	SBIR Phase II
PI/PD:	Hashemi, Kevan
Application Title:	SBIR Phase II: A Novel Dense Fiber Array for Astronomical Spectroscopy
Rating:	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.

Strengths - The technology offers a low cost solution that might enhance the ability to conduct deeper astronomy research with a device that is easy to retrofit and use. The process proposed makes sense and looks like the resources are adequate. Plan to test success is strong, should portray a clear success if it goes well.
Weaknesses - Looks like some high capacity instrumentation is still needed, calibration and installation look to be a bit challenging.

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

Strengths Astronomical research can prove vital to understanding the universe in depth, with the use of the technology this can be made accessible to more scientists. The proposal takes into consideration manufacturability and ease of installation, these two critical factors are often ignored and can make or break a technology for adoption.

Weakness - The technology seems to be a applicable to a very narrow field and to a very limited group of equipment. Granted, they are high ticket items and the opportunity for maintenance is there, but the broader impact seems limited.

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

Summary Statement

The proposal is well written and presents a solid case for support when considering the opportunity to make a powerful tool available to many astronomers based on the innovation. The only concern is the limited scope of the application, but it seems to be a solid opportunity within its market.

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Agency Name:	National Science Foundation
Agency Tracking Number:	**2334185**
Organization:	
NSF Program:	SBIR Phase II
PI/PD:	Hashemi, Kevan
Application Title:	SBIR Phase II: A Novel Dense Fiber Array for Astronomical Spectroscopy
Rating:	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.

1. Strength: Though only one of many opportunities, the potential to help resolve the Hubble constant crisis is significant. Signals from JWST and cosmic background radiation have only added more confusion to the range of measurements. The ability to individually target the spectrum's of thousands of individual stars during a single telescope exposure could reduce the time to capture red shift data by many years and put the constant back into the Hubble constant.

2. Strength: The use of a targeting feedback camera system that signals fine grained control/alignment of individual fibers is a transformative approach that may be applied to other nanometer alignment applications.

Weakness: The complexity required to install each fiber on a circuit board suggests great risk for the future objective of installing thousands of fibers on a board.

3.Strength: The overall self contained “black box” and calibration approach are well thought out. Weakness: Given the need for micrometer precision, the low frequency noise from terrestrial sources may prove problematic for the alignment process. For isolated testing, suggest that the setup incorporate an active damper system (similar to what is incorporated on large telescopes).

4. Strength: Though the team is qualified for the project, they lower their risk further by the establishment of a prototyping partnership with Texas A&M University’s Otto Struve Telescope.

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

1. Weakness: Though the firm makes a convincing arguement of how the technology will benefit astronomy, its broader impact narrative should discuss how the innovation could support future students in STEM and or improve optics related applications in other industries.

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

1. Strength: The firm surveyed astronomers to identify a $54 million market opportunity.

Weakness: Competitors with less effective multi-object spectra solutions already exist and will put pressure on this tight market as their own technologies evolve.

6. Strength: Yes, the firm’s implemented and tested a smaller version of the desired application in phase 1, providing results that represent an excellent jumping off point into a scaled phase II prototype.

Summary Statement

Strength: The technology, method, and application are well thought out and have great potential for cosmology.

Weakness: The market for the application is narrow and may have difficulty sustaining itself long term. Suggest exploring other vertical opportunities for this novel optical technology.

Proposal Review 3 : 2334185

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Agency Name:	National Science Foundation
Agency Tracking Number:	**2334185**
Organization:	
NSF Program:	SBIR Phase II
PI/PD:	Hashemi, Kevan
Application Title:	SBIR Phase II: A Novel Dense Fiber Array for Astronomical Spectroscopy
Rating:	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.

This STTR project (this should be an STTR project not an SBIR project) proposes to develop a direct fiber positioning system for a spectrograph that can be easily mounted into an existing Cassegrain telescope at the McDonald Observatory position in Texas. Phase II will increase the number of fibers from 16 in phase I to 80 in Phase II. The ultimate goal is to have direct control over 5,000 fibers. As the number of fibers is increased it will become possible to make new astronomical observations such as the composition of globular clusters or the lithium composition in red giants.
Strengths
+Novel method to gain spatial resolution to view celestial structures.
+Phase I demonstrated the use of piezo control over fiber positioning.
+Good collaboration with TAMU to gest technology on Stuve telescope.
+Good experience in fabrication from Phase I.
+Strong letters for collaborations