Mississippi State University
Notice of Proposed Sole Source Purchase

Mississippi State University anticipates purchasing the item(s) listed below as a sole source purchase. Anyone objecting to this purchase shall follow the procedures outlined below.

1. Commodity or commodities to be purchased (make, model, description):

Specialized theoretical nuclear physics research, scientific consulting, and computational modeling services provided by Obsidian Research, LLC, under the direction of Dr. Matthew Mumpower.

Services will include developing physics informed machine learning models for extracting nuclear physics information from experimental datasets, constructing and validating digital twins of experimental detector systems and research capabilities at Mississippi State University, and developing theoretical and computational models relevant to matter–antimatter interactions.

2. Explanation of the need to be fulfilled by this item(s), how is it unique from all other options, and why it is the only one that can meet the specific needs of the department:

The Department of Physics and Astronomy at Mississippi State University conducts experimental nuclear physics research requiring advanced theoretical models and computational techniques to interpret complex experimental data. These efforts require specialized expertise at the intersection of nuclear structure and reaction theory, artificial intelligence, statistical inference, and computational physics.

The requested services will support three complementary research efforts: developing machine learning methods that incorporate known nuclear physics to extract information from experimental measurements; constructing digital twins that accurately reproduce the response of existing experimental equipment and support the development of new analysis techniques; and advancing theoretical models for fundamental matter–antimatter interactions.

These activities require more than conventional software development or general data analysis. They demand a detailed understanding of the underlying nuclear physics, the limitations of experimental measurements, and the integration of theoretical predictions with computational simulations. Dr. Mumpower has demonstrated expertise in applying advanced nuclear theory,

machine learning, and computational methods to complex nuclear physics problems, including the development of physically interpretable machine learning models for nuclear properties.

The requested service is therefore a specialized scientific research effort requiring direct involvement from an expert with demonstrated experience developing and integrating these approaches. The work must be tailored to MSU's specific experimental systems, datasets, and research objectives rather than relying on commercially available software or general purpose consulting services.

3. Name of company/individual selling the item and why that source is the only possible source that can provide the required item(s):

Obsidian Research, LLC, through Dr. Matthew Mumpower.

Dr. Mumpower is an internationally recognized theoretical nuclear physicist with extensive experience in nuclear theory, computational modeling, and machine learning applications in nuclear physics.

Through ongoing scientific discussions and project development, Dr. Mumpower has developed a detailed understanding of our specific research objectives, experimental capabilities, and computational challenges. This level of understanding has been difficult to establish with other collaborators, and we have not identified another researcher who has demonstrated the same combination of relevant expertise, familiarity with our projects, and interest in pursuing this work.

The proposed research requires close integration between experimental nuclear physics and advanced theoretical modeling. Dr. Mumpower's existing knowledge of our research program makes it possible to move directly into the development and implementation of the required models, rather than spending substantial additional time establishing the scientific background and technical requirements with a new provider.

For these reasons, Obsidian Research, LLC is uniquely positioned to provide the specialized research services required for these projects.

4. Estimated cost of item(s) and an explanation why the amount to be expended is considered reasonable:

$14,000.00 Total cost

The proposed cost is considered reasonable based on the specialized scientific expertise required, the anticipated level of effort, and the complexity of the computational models and research deliverables. The services require advanced training and research experience in theoretical nuclear physics, artificial intelligence, and scientific computing, capabilities that are not ordinarily available through general purpose consulting or software development providers.

The proposed expenditure will support the development and validation of computational tools and scientific models that can be applied across multiple ongoing and future research projects at MSU, providing value beyond the initial contract period.

5. Explanation of the efforts taken by the department to determine this is the only source and the efforts used to obtain the best possible price:

The department has established scientific collaborations and engaged in discussions with researchers working in theoretical and experimental nuclear physics. Through these interactions, we have found that Dr. Mumpower has developed a particularly strong understanding of our research needs and has expressed a clear interest in contributing directly to these efforts. Other potential collaborators have not demonstrated the same level of project-specific understanding or interest in undertaking this work.

Our decision to work with Obsidian Research, LLC reflects this existing scientific engagement and the strong alignment between Dr. Mumpower's expertise and our research objectives. Engaging another provider would require additional time and resources to establish the same level of understanding, without assurance that the resulting work would meet our specific research needs.

The scope of services and associated costs will be established directly with Obsidian Research, LLC to ensure that the proposed expenditure is reasonable and appropriately matched to the anticipated scientific effort and deliverables.

Any person or entity that objects and proposes that the commodity listed is not sole source and can be provided by another person or entity shall submit a written notice to:

Jennifer Mayfield, CPPO
Director of Procurement Services, Chief Procurement Officer
jmayfield@procurement.msstate.edu
Subject Line must read “Sole Source Objection”

The notice shall contain a detailed explanation of why the commodity is not a sole source procurement. Appropriate documentation shall also be submitted if applicable.

If after a review of the submitted notice and documents, MSU determines that the commodity in the proposed sole source request can be provided by another person or entity, then MSU will withdraw the sole source request publication from the procurement portal website and submit the procurement of the commodity to an advertised competitive bid or selection process.

If MSU determines after review that there is only one (1) source for the required commodity, then MSU will appeal to the Public Procurement Review Board. MSU will have the burden of proving that the commodity is only provided by one (1) source.

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