NATIONAL SCIENCE FOUNDATION
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**NSF 23-034**

# Dear Colleague Letter: Computational and Data-Enabled Science for New Discovery

December 20, 2022

Dear Colleagues:

The Computational and Data-Enabled Science and Engineering in the Mathematical and Statistical Sciences (CDS&E-MSS) program in the Division of Mathematical Sciences (DMS) seeks to stimulate the creation and development of the next generation of mathematical and statistical computational tools and algorithms. These algorithms and tools should lead to innovation within mathematics and statistics while addressing the challenges presented by the ever-expanding role of computational experimentation, modeling, and simulation, and the explosion in production and analysis of digital data from experimental and observational sources.

As part of this effort, this Dear Colleague Letter (DCL) invites proposals that aim to advance mathematics or statistics and address computational or data-oriented challenges with approaches that range from model-based to data-driven.

## BACKGROUND

In the past few years, several programs in DMS have received increasing numbers of proposals on mathematical and statistical foundations and tools for data-enabled methodologies that include machine learning, topological data analysis, inverse problems, reduced-order models among others. Simultaneously, the use and importance of computational tools, models, and experiments in mathematics, statistics, and other sciences have increased.

The Division of Mathematical Sciences seeks to respond to these needs and challenges on a variety of fronts.

## CDS&E-MSS

The CDS&E-MSS program is interested in innovative, theoretically justified computational

tools and algorithms in mathematics and statistics that are accessible to a wide range of disciplines in science and engineering. Examples of successful proposals include, but are not limited to, projects that (1) involve the creation and development of algorithms and computational tools that lead to robust software packages for wide use in science and engineering, (2) develop mathematical and statistical theory and tools for better implementation and understanding of interpretable machine learning and artificial intelligence (AI) methods or (3) are novel approaches in mathematics and statistics to causal forecasting problems and big data. The program is unlikely to be supportive of data analysis or computational modeling projects that do not feature new or recently developed methodologies and their implementation.

Inquiries about the DCL and questions about the submission of proposals should be directed to the Program Directors of the CDS&E-MSS program (see the program webpage https://beta.nsf.gov/funding/opportunities/computational-data-enabled-science-engineering for additional information). Proposals in response to this DCL for FY23 funding consideration should be submitted to the CDS&E-MSS program by **March 15, 2023**.

Sincerely,

Sean L. Jones, Assistant Director
Directorate for Mathematical and Physical Sciences (MPS)