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Award Abstract # 2240374 Consortium Proposal for CMB-S4 Continuing Design

NSF Org: [AST](#)
[Division Of Astronomical Sciences](#)

Recipient: UNIVERSITY OF CHICAGO

Initial Amendment Date: August 10, 2023

Latest Amendment Date: August 10, 2023

Award Number: 2240374

Award Instrument: Cooperative Agreement

Program Manager: Nigel Sharp
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AST Division Of Astronomical Sciences
MPS Direct For Mathematical & Physical Scien

Start Date: August 15, 2023

End Date: July 31, 2027 (Estimated)

Total Intended Award Amount: \$21,443,985.00

Total Awarded Amount to Date: \$3,697,309.00

Funds Obligated to Date: FY 2023 = \$3,697,309.00

History of Investigator: John Carlstrom (Principal Investigator)
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Jeffrey Zivick (Co-Principal Investigator)
James Strait (Co-Principal Investigator)

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Sponsor Congressional District: 01

Primary Place of Performance: University of Chicago
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Primary Place of Performance Congressional District: 01

Unique Entity Identifier (UEI): ZUE9HKT2CLC9

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NSF Program(s): OFFICE OF MULTIDISCIPLINARY AC

Primary Program Source:

Program Reference Code(s): 1207

Program Element Code(s): 1253

Award Agency Code: 4900

Fund Agency Code: 4900

Assistance Listing Number(s): 47.049

ABSTRACT

This award will fund the NSF side of a continuing collaboration with the Department of Energy (DoE) Office of High Energy Physics (HEP), to further the design of the CMB-S4 experiment, which is a cosmic microwave background (CMB) Stage IV facility, as defined during the 2013 Snowmass conference. Funding will support, specifically, completing assessment of alternative instrument configurations while advancing technical, budgetary, and administrative deliverables with the intention of reaching readiness for a construction project. This work builds on previous activity supported by NSF and by DoE/HEP. CMB-S4 uses proven technologies, building on decades of development, and takes them to unprecedented scales. If successful, it will provide a powerful and unique millimeter-wave survey covering 70% of the sky at high cadence, and will cross critical science thresholds in our understanding of the origin and evolution of the Universe. The discovery space of the information encoded in CMB polarization, in the gravitational lensing of the CMB, in other secondary effects, and in yet-to-be-discovered signals, is maximized by the design of CMB-S4. Unique data products from this survey will benefit the entire astronomical community and a broader, multi-disciplinary research community in an era in which multi-wavelength and multi-messenger astronomy is the path to understanding and discovery. CMB-S4 provides a powerful and synergistic complement to major upcoming astronomical surveys and facilities, such as the Vera C. Rubin Observatory Legacy Survey, the Nancy Grace Roman Space Telescope, and the James Webb Space Telescope. The project comes with a plan to increase diversity in CMB-S4 science and in STEM fields, driven by three principles: diversity of participants, diversity of training, and diversity of outcomes. Early-career training includes annual four-day summer schools, and development of partnerships with HBCUs and URM-focused institutions to increase diversity further.

This is an important and transformative project during a time of significant budget uncertainty. Second and third years of funding will be re-evaluated and reprioritized towards the end of the first year, pending reviews, availability of funding, and phasing of the work involved in the project.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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