Project Introduction

Normal-Insulator-Superconductor (NIS) tunnel junctions are solid-state devices capable of cooling thin film or bulk payloads at sub-Kelvin temperatures. The performance of NIS refrigerators has improved steadily in recent years and we will leverage this progress to build an array of microwave polarimeters with integrated NIS cooling. The use of NIS refrigerators will improve pixel sensitivity, size, and mechanical robustness. By design, the polarimeter array will be well matched to a future suborbital mission to study polarization in the cosmic microwave background. The array will also demonstrate the suitability of NIS refrigerators for a future NASA satellite mission.

Primary U.S. Work Locations and Key Partners

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Organizational Responsibility

Organizations Performing Work

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<tbody>
<tr>
<td>Supporting Organization</td>
<td>U.S. Government</td>
<td>Evanston, IL</td>
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Primary U.S. Work Locations

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<th>Location</th>
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<tbody>
<tr>
<td>Colorado</td>
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<td>Maryland</td>
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Astrophysics Research And Analysis Program

Large-scale Polarimeter Array with Integrated Tunnel Junction Cooling
Active Technology Project (2017 - 2019)

Project Management

Program Manager:
Linda Sparke

Principal Investigator:
Joel Ullom

Co-Investigators:
Shannon M Duff
Johannes Hubmayr
William C Jones
Gene C Hilton
Xiaohang Zhang
Julie Weiblinger

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 4

Technology Areas

Primary:

- Science Instruments, Observatories, and Sensor Systems (TA 8)
  - Remote Sensing Instruments and Sensors (TA 8.1)

For more information and an accessible alternative, please visit: https://techport.nasa.gov/view/90949
Target Destination

Outside the Solar System