

OFFICE OF  
POLAR PROGRAMS

# NSF South Pole Infrastructure

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High Energy Physics Advisory Panel – May 9, 2024



# NSF South Pole Station



## Science Station in an Extreme Environment

- 9300 feet elevation
- Temperatures range from minus 70°C to minus 20°C
- ~0.5 inches annual snowfall
- Katabatic Winds
- Snow build-up ~1 ft/year
- Half the year Dark Night
- Accessible only from November through mid-February
- 150 people in austral summer, 40-45 people in austral winter



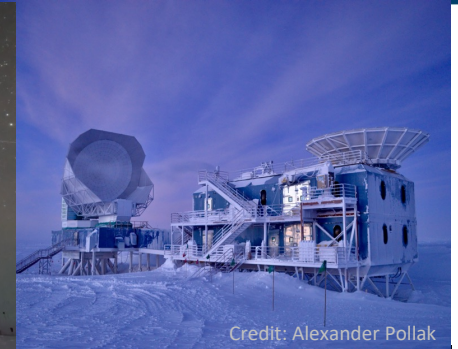
Credit: NSF

# Multi-Disciplinary Scientific Platform



## Physics & Astronomy

- IceCube Neutrino Observatory
- South Pole Telescope
- BICEP Array



## Atmospheric & Geospace Science

- Atmospheric Research Observatory
- SuperDARN



## Seismology

- SPRESSO
- CAREER Seismology Investigation



## Glaciology

- COLDEX
- ICESat-2 88 South

# Logistics Overview



## Port Hueneme, CA

- Cargo transported by ship → Christchurch, NZ

## Christchurch, New Zealand

- Cargo transported by ship → NSF McMurdo Station
  - U.S. Coast Guard icebreaker enables 1-2 cargo ships per year and 1 fuel tanker every other year. Arrives in January
  - Limited cargo transported by plane → McMurdo
- People transported by plane → NSF McMurdo Station
  - U.S. Air National Guard flights on C-17 and LC-130 planes

## NSF McMurdo Station

- Overland traverse of cargo and fuel → NSF South Pole Station
- Cargo and fuel transported by LC-130 → NSF South Pole Station
- People transported by LC-130 → NSF South Pole Station

## NSF South Pole Station



# Logistics Constraints to SPS



## NSF McMurdo Station

- Construction of new Lodging Building is expected to be completed in 2026
- During peak of Austral summer only LC-130s can land



## Traverses

- 3 to 4 week traverse covers 1600 km over Ross Ice Shelf and Transantarctic Mountains
- Tows fuel bladders and some cargo, but not suitable for large equipment or or all items



## Aircraft

- Aging LC-130 fleet
- Efforts underway to identify alternatives

## Weather

# NSF SPS Current Status

## COVID Impacts

### Station Infrastructure

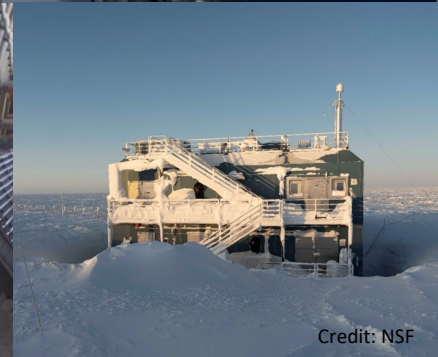
- Snow removal & Building Lifts
- Refurbishment of aging infrastructure
- \* South Pole Station Master Plan

### Access Limitations

- Aircraft
- NSF McMurdo Station

### Resources Limitations

- Fuel
- Beds



# NSF South Pole Station Priorities



## **Priorities for NSF South Pole Station:**

- Meet our current science commitments
- Refurbish critical station Infrastructure

After extensive analysis, NSF has made the decision not to move the CMB-S4 project in its current form into the NSF Major Facility Design Stage at this time. The agency must prioritize the recapitalization of critical infrastructure at the South Pole so that the groundbreaking research it enables can continue to thrive.

NSF is committed to cosmic microwave background science and will continue to support current CMB activities at the South Pole and in Chile. We are in active discussions with DOE and the CMB-S4 Project about the path forward. NSF will work with the community to explore possible options for future CMB science.



U.S. National Science Foundation  
GEO Office of Polar Programs

Thank you