The B-mode Foreground Experiment (BFORE) is a proposed NASA balloon designed to make optimal use of the sub-orbital platform by concentrating on three dust foreground bands (270, 350, and 600 GHz) that complement ground-based cosmic microwave background (CMB) programs. BFORE will survey ~1/4 of the sky with 1.7 - 3.7 arcminute resolution, enabling precise characterization of the galactic dust that now limits constraints on inflation from CMB B-mode polarization measurements. In addition, BFORE’s combination of frequency coverage, large survey area, and angular resolution enables science far beyond the critical goal of measuring foregrounds, including velocity measurements or constraints on thousands of galaxy clusters, a new window on the cosmic infrared background, and probes of magnetic fields in the interstellar medium. We review the science case, timeline, and instrument design, which is based on a compact off-axis telescope coupled to >10,000 superconducting detectors.

**OBSERVATIONS AND SCIENCE**

- **Goal:** Improve Inflation constraints by characterizing foregrounds
- **Science cases:**
  - Planck measurements suggest several dust bands are likely needed
  - Break degeneracies from spatially varying dust
  - Enable new measurements of galactic magnetic fields & CIB
  - Kinematic Sunyaev-Zel’dovich (kSZ) measurements of individual clusters
  - kSZ figure-of-merit is tripled
  - Overlap with Advanced ACTPol, SPT-3G, BICEP/Keck, Polarbear, CLASS…

**DETECTOR ARRAYS**

- **Feedback-Coupled Superconducting Polarimeters**
- **Transition-Edge Sensor (TES) bolometers based on ACTPol multichroics**
- **Kinetic Inductance Detectors (KIDs)**

**INSTRUMENT OVERVIEW**

- **Aperture:** 1.35 meters
- **3 degree field-of-view**
- **Secondary cooled to 4K**
- **Cold reflective HWP**
- **Compound silicon lens isolates**
- **AR coatings**
- **He fridge cools detectors to 0.3K**
- **Antarctic flight (28+ days)**

**REFERENCES**

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