

# South Pole Telescope 3rd Generation Receiver

From November 2016 to February 2017 the McGill Cosmology Instrumentation Laboratory team from McGill installed the readout system for the new South Pole Telescope microwave receiver at the Amundsen-Scott research station in Antarctica.



This 3rd generation instrument represents a major upgrade for the South Pole Telescope, increasing the number of detectors by about an order of magnitude. The instrument is designed to measure the cosmic microwave background (CMB) B-mode polarization, exposing the signatures of gravitational lensing and, perhaps, evidence of gravitational waves from the early universe. The camera, like its predecessor, used readout electronics developed and built at McGill. Joshua Montgomery and Matt Dobbs were at the South Pole representing McGill, part of a much larger team that includes our partners from across the United States. Together, the team logged more than 1100 days at the South Pole, bringing this project to fruition.



The team is now preparing for its next polar mission, for maintenance and improvements to the camera. Graduate students Gavin Noble and Joshua Montgomery will journey to the South Pole, and Joshua plans to spend the dark, cold winter there operating the telescope.

The South Pole Telescope is also used as part of the Event Horizon Telescope (EHT), an ultra-long baseline interferometer that provides the resolution necessary to image the black hole at the center of our galaxy. During the austral summer, new interferometric observations were carried out with the South Pole Telescope providing an extreme southern baseline for the EHT.



« **Top:** The focal plane of the South Pole Telescope 3g camera.

**Middle:** Amy Bender (Argonne National Lab, formerly a McGill postdoc) and Matt Dobbs (McGill) assembling the cryogenic wiring for the focal plane.

**Bottom:** The crew at the South Pole late night December 3 after closing the cryostat for its first cooldown.