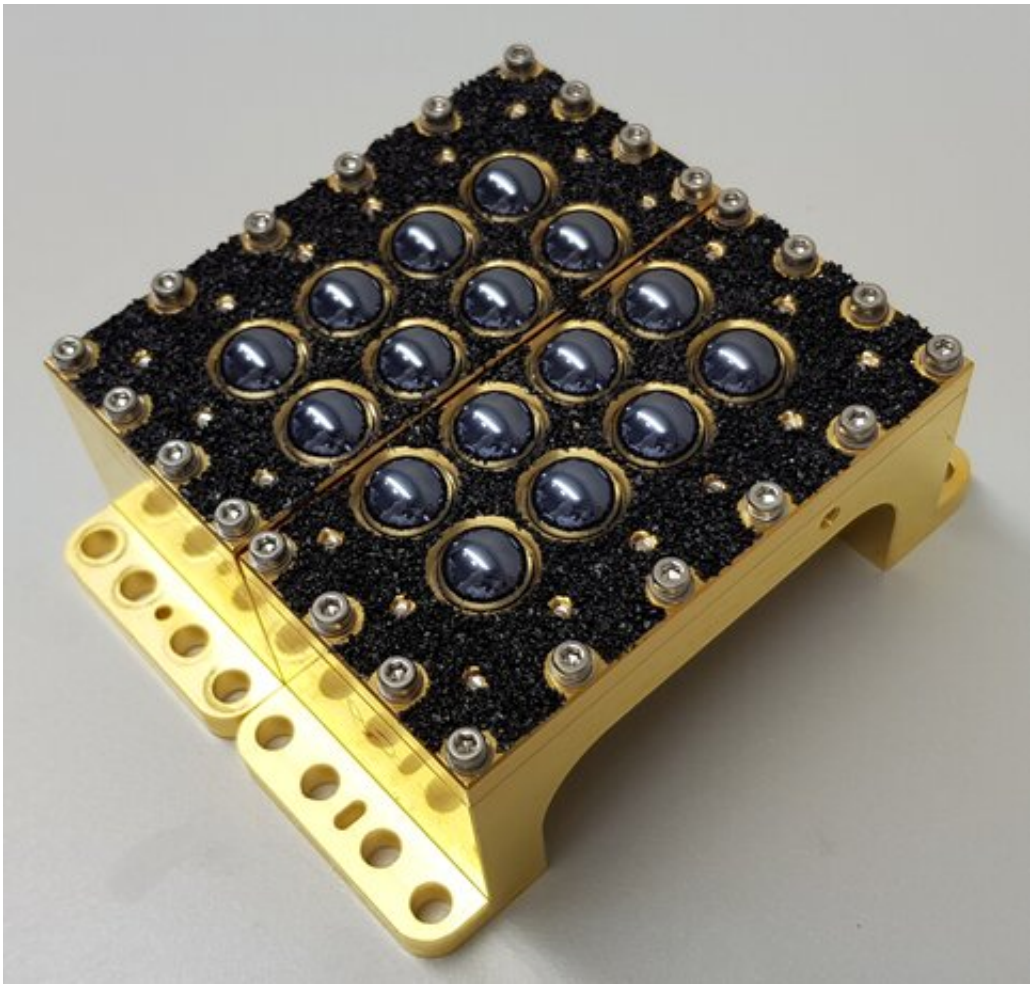
Two new arrays complete detector for Antarctic balloon observatory mission

September 10 2020, by Erik Arends

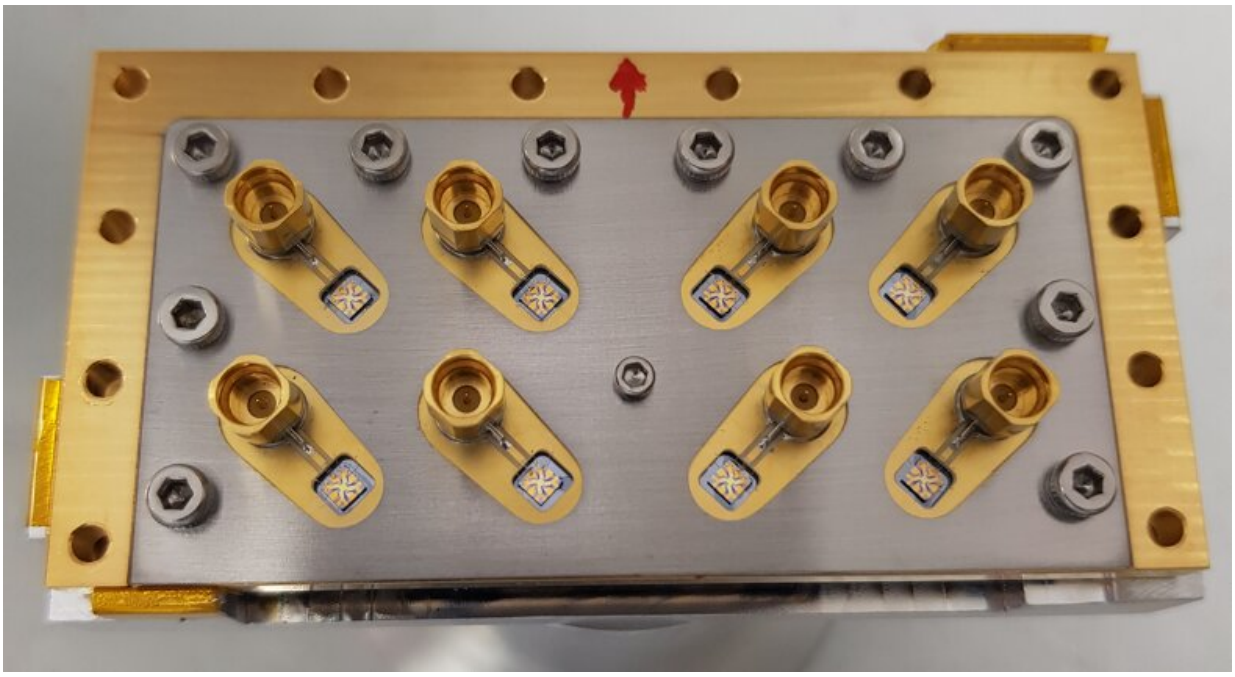


Two arrays for GUSTO's 1.4 and 1.9 terahertz channels. Credit: SRON / TU Delft

GUSTO is a balloon observatory that will drift in the Earth's atmosphere for over 75 days at the edge of space at 36 km altitude, simultaneously mapping three types of material in the gas and dust between stars. SRON and TU Delft developed all three detector arrays for this NASA mission. The final two flight arrays have now passed their pre-shipment review and have been shipped to the University of Arizona for integration into the balloon observatory. Together with the earlier shipped array for 4.7 terahertz, the 1.4 and 1.9 terahertz arrays complete GUSTO's flight detector.

The launch is scheduled for December 2021 from Antarctica. The observatory consists of a telescope of 1 meter in diameter and three observation instruments carried by an ultra-long duration balloon (ULDB). The GUSTO team members from SRON and TU Delft, led by Jian-Rong Gao, have now delivered the two arrays for the 1.4 and 1.9 terahertz channels. The array for the 4.7 terahertz channel was already finished. Both arrays meet the sensitivity requirements and the pointing requirements of the lens-antenna beam, which is no more than 0.1 degree among eight pixels, with a margin of a few pixels. The design, manufacture, assembly and testing of the array were carried out at SRON, while the superconducting detectors were developed at TU Delft.

GUSTO will measure the emission lines of ionized nitrogen (NII), carbon (CII) and oxygen (OI) in the spectrum of the interstellar medium—the material floating in between stars. This helps scientists to determine the life cycle of interstellar gas in our Milky Way, witness the formation and destruction of star-forming clouds and understand the dynamics and gas flow in the vicinity of the center of the galaxy.



The back side of one of the arrays, with the protection cover removed. The eight detector chips, mounted on the backside of a silicon lens, can be seen from eight holes in the PCB circuit board Credit: SRON / TU Delft

Provided by SRON Netherlands Institute for Space Research