Technology developed in Brazil will be part of the International Space Station

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Presented by Guillermo Giménez de Castro, a professor at the Mackenzie Radio Astronomy and Astrophysics Center (CRAAM) during FAPESP Week London, instrument created in São Paulo will be improved in collaboration with Russia and will measure solar flares; launch is scheduled for 2022. Credit: André Julião

A new version of equipment developed in Brazil—the Solar-T—will be sent to the International Space Station (ISS) to measure solar flares. It is estimated that the sun-THz, the new photometric telescope, will be launched in 2022 on one of the missions to the ISS and will remain there to take consistent measurements.

The photometric telescope works at a frequency of 0.2 to 15 THz, which can only be measured from space. In parallel, another telescope, the HATS, will be installed in Argentina. That instrument, which will be ready in 2020, will work at a frequency of 15 THz on the ground. The HATS is being constructed as part of a Thematic Project led by Guillermo Giménez de Castro, a professor at the Mackenzie Radio Astronomy and Astrophysics Center (CRAAM) at Mackenzie Presbyterian University (UPM).

The equipment was part of the subject matter presented during the session given by Giménez de Castro at FAPESP Week London, February 11-12, 2019. The researcher explained that solar explosions, or flares, are phenomena that occur on the sun's surface, causing high levels of radiation in outer space.

The Sun THz is an enhanced version of the Solar-T, a double photometric telescope that was launched in 2016 by NASA in Antarctica in a stratospheric balloon that flew 12 days at an altitude of 40,000 m. The Solar-T captured the energy emitted by solar flares at two unprecedented frequencies: from three to seven terahertz (THz), which corresponds to a segment of far infrared radiation. The Solar-T was designed and built in Brazil by researchers at CRAAM together with colleagues at the Center for Semiconductor Components at the University of Campinas (UNICAMP).

Pierre Kaufmann, a researcher at CRAAM and one of the pioneers of radioastronomy in Brazil, died in 2017. The new equipment, with Kaufmann as one of its creators, will be the product of a partnership with the Lebedev Physics Institute in Russia. "The idea now is to use a set of detectors to measure a full spectrum, from 0.2 THz to 15 THz," Giménez de Castro said.

Most of the new photometric telescope will be built in Russia, but it will

have parts made in Brazil, such as the equipment that will be used to calibrate the entire instrument. "The technology and concept behind the telescope were developed here [in Brazil]. The Russians liked the idea and are reproducing it and adding more elements. We are working on the cutting edge of technology. Forty years ago, the cutting edge for what could be done was 100 gigahertz. With the results obtained over the years, we are seeking higher frequencies, and prospects for the future are good," said the researcher.

The functionality of the equipment lies in its graphene sensors. Highly sensitive to terahertz frequencies, graphene sensors are able to detect polarization and can be adjusted electronically. Experiments in creating these detectors are currently underway at the Center for Advanced Graphene, Nanomaterials and Nanotechnology Research (MackGraphe) at Mackenzie Presbyterian University, a FAPESP-funded center.

Provided by FAPESP

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