Research in Astrophysics from Space (E)
Small Satellites and Constellations for Astrophysics and Planetary Exploration (E1.17)

# DETECTING COSMIC EXPLOSIONS WITH THE NANOMIRAX SATELLITE

Joao Braga, joao.braga@inpe.br
National Institute for Space Research (INPE), Sao Jose Dos Campos, Brazil
Otavio S Cupertino Durao, otavio.durao@inpe.br
National Institute for Space Research (INPE), Sao Jose Dos Campos, Brazil

The nanosat/cubesat revolution has provided new opportunities to develop and launch small ($\sim$1000 cm$^3$), low-cost ($\sim$US$ 1M) experiments in space in very short timeframes ($\sim$2 years). We present here recent progress made in the development of a hard X-ray (30–200 keV) experiment, LECX ("Localizador de Explosões Cósmicas de Raios X"), which is the payload of the nanoMIRAX satellite. The mission is designed to detect and localize within a few degrees events like Gamma-Ray Bursts and other explosive phenomena, at a rate of $\sim$10 events per year. The experiment uses 4 planar CdZnTe detectors ($10 \times 10 \times 2$cm$^3$) and a passive shielding system (Pb-Sn-Cu). An algorithm was developed to determine the incoming direction of the X rays during a cosmic burst that occurs in the $53^\circ \times 53^\circ$ (FWHM) field-of-view; the calculations are based on the registered detector counts and the attitude of the satellite. The satellite platform is a 2U CubeSat standardized bus with the LECX experiment taking 1 "U" and the satellite service module taking the other "U ". This is the first CubeSat platform developed by the Brazilian private sector. We are currently building the flight model and hope to launch nanoMIRAX in 2023. In the current multimessenger era of astronomy, a constellation or swarm of small spacecraft such as nanoMIRAX can be a very cost-effective way to search for electromagnetic counterparts of gravitational wave events produced by the coalescence of compact objects.