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SYMPOSIUM ON TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Scientific Motivation and Requirements for Future Space Astronomy and Solar System Science Missions (2)

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THE ISS-LOBSTER GAMMA-RAY TRANSIENT MONITOR

Abstract

iLobster is a mission proposed by NASA to go to the ISS. It is composed of a Wide-Field Imager (WFI), and a multi-directional Gamma-ray Transient Monitor (GTM) to research transient high-energy astrophysical sources. WFI will be built by NASA/GSFC while this presentation is for the GTM, to be built at the Technion in collaboration with Israel Aerospace Industries (IAI). iLobster's main science goal is to detect electromagnetic (EM) counterparts of gravitational waves (GW) detected by GW observatories such as LIGO. Observation of simultaneous GW and EM counterparts will address fundamental questions in general relativity regarding the nature of astrophysical GW sources. EM detection will also increase LIGO's sensitivity to these events. Promising candidates for LIGO GW sources are coalescing neutron stars, which are expected to also burst in gamma-rays (short GRBs). The GTM will measure these GRBs and other transient gamma-ray events, and trigger the WFI. Each GTM detector consists of a crystal scintillator, a photo-multiplier (PMT), a power supply unit, analog and digital (Field Programmable Gated Array - FPGA) processing electronics, designed to reconstruct the energy of each incoming photon, and yield the light-curve and spectrum of the GRB. The analog processor reshapes the pulse from the PMT, which is converted to digital. The FPGA detects the pulse height and computes the photon energy. It also triggers on a significant count rate increase. An embedded microprocessor on the FPGA analyzes the light-curve and spectrum over the entire GRB. The microprocessor also controls and monitors the detector, its housekeeping and communication. We will present the full design and realization of the GTM instrument as well as initial calibration measurements.