

## The CATSAT Student Explorer Mission

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CATSAT (Cooperative Astrophysical and Technology SATellite) is one of three missions being developed under NASA/USRA's Student Explorer Demonstration Initiative (STEDI) for launch in 1997-98. STEDI is a pilot program to "assess the efficacy of smaller, low-cost spaceflight missions... that is matched to the traditional process of research and development at universities". This program allows \$4 million and 2-3 years for all aspects of the mission, i.e. instrument and satellite development, integration, testing, mission operations and data analysis.

CATSAT is an astrophysics mission being developed in collaboration by three university teams. Its mission is to study the nature and distance scale of Cosmic Gamma Ray Bursters. Its prime instrumentation is a Soft X-Ray spectrometer (0.5-15 keV), with a total area of 190 cm<sup>2</sup> and 5.5 sr. FOV, to measure the photoelectric absorption along the line-of-sight and thus determine a distance scale to the burst source. This sensor is supported by three context sensors to determine intensity, spectral and directional information. These include four Hard X-Ray spectrometers (15-400 keV, 4x45 cm<sup>2</sup>), a Directional Gamma-ray Spectrometer (0.3-6 MeV, 135 cm<sup>2</sup>) and an array of nine X-ray Albedo sensors (15-400 keV, 9x80 cm<sup>2</sup>) which are also sensitive to polarization in the burst's x-ray emissions. The science payload will generate 24 Mbytes of data per 12 hours.

CATSAT is expected to be launched in mid 1998 into a 550 Km polar sun synchronous 6am-6pm orbit. The mission form factor is a rectangular box with a base of 72 cm, a height of 102 cm and a launch mass of 135 Kg. A combination of body mounted cells and deployable solar panels produce a total of 150 watts. The mission is 3-axis stabilized utilizing reaction wheels and magnetic torquers to provide continuous solar-(near zenith) pointing to 5°, in orbits up to 30° from its initial terminator orbit. Solar and earth-horizon sensors are used for attitude determination and will provide after-the-fact knowledge to 1°. An onboard GPS receiver will provide universal time and orbital navigation data. The GPS information together with an onboard three-axis magnetometer will be used for a coarse attitude solution during the initial turn-on as well as other orbital emergencies, and also act as a backup for the primary sensors. Commanding and science data retrieval will take place every 12 hours by student operating teams at the university sites. A 10 watt low power standby mode is included to manage orbital emergencies between contacts.

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