MASARYKOVA UNIVERZITA

Spaceborne Astrophysics and the Use of CubeSats in the Monitoring of the High-Energy Sky

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Lecture Abstract

Among the most important new scientific disciplines that developed in the past half century is high-energy astrophysics. It studies the hottest regions and most energetic processes in the Universe, such as black holes growing by sucking in matter from the surrounding Universe, coalescing black holes and neutron stars emitting gravitational waves, exploding stars called supernovae, clusters of galaxies, etc. Because X-rays and gamma-rays produced by these phenomena get absorbed by Earth's atmosphere their observations need to be performed from space. Modern space observatories grew into exceedingly complex several hundred million dollar missions. Therefore, only a handful of space observatories are launched per decade worldwide. However, miniaturisation recently opened new opportunities for breakthrough science using CubeSats (nanosatellites), which are also affordable for small countries or universities. We are proposing to perform a detailed study and development for a fleet of CubeSats to perform an all sky monitoring and localisation of gamma-ray bursts (GRB), which are likely to originate at the explosions of very massive stars and during the coalescence of two neutron stars or neutron stars and black holes. These phenomena are particularly interesting, because their detailed study has a potential to also provide breakthroughs in fundamental physics.