Z320a　INSPIRE: challenge of 50-kg class satellite for MeV gamma-ray astronomy

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Waseda University and Tokyo Tech are developing a 50-kg class small satellite INSPIRE (INnovative Space Probe for Imaging R-process Emission), scheduled for launch in FY2026. The satellite carries a BOX-type Compton camera (CC-BOX), which can visualize 30 keV$-$3 MeV X-/gamma-rays with a typical angular resolution of $5°$ (FWHM) along with a wide FOV of $\simeq 3$ str. The CC-BOX comprises a pixelized 3D position-sensitive Ce:GAGG scintillators coupled with an MPPC arrays to cover geometrical area of 10×10 cm^2. Moreover, Ce:GAGG arrays are positioned on the sides of the detector to enhance its sensitivity than COMPTEL onboard Compton Gamma-Ray Observatory. In this talk, we begin by detailing the design of the CC-BOX, its data processing flow, such as the high-speed DAQ and USB boards,and Raspberry Pi as well as weight and power specifications. We then assess the detector's performance through both hands-on device testing and simulations. Indeed, the prototype model of CC-BOX has already been installed and tested for diagnostic imaging in nuclear medicine and observation of atmospheric phenomena, such as in the world's first successful gamma ray imaging of thunderclouds (Kuriyama et al. 2022, GRL). I will describe in detail the imaging experiments using the prototype model to date, along with observation plans in orbit to achieve various scientific goals.