Contribution ID: **86** Type: **POSTER**

Development and Verification of Signal Processing System of Avalanche Photo Diode for the Active Shields onboard ASTRO-H

Saturday 26 September 2015 19:55 (1 minute)

ASTRO-H is the 6th Japanese X-ray observatory which is scheduled to be launched in 2015. Two of onboard instruments, the Hard X-ray Imager (HXI) and the Soft Gamma-ray Detector (SGD)
are surrounded by large and thick BGO ($Bi_4Ge_3O_{12}$) active shields to reduce the background. Since there are large number of BGO crystals with various
types of size and shape, we apply Avalanche Photo Diode (APDs) for light sensor of these BGO detectors.

For the signal processing system of the BGO-APD active shield, we introduce two types of digital filter to generate trigger signals to satisfy following two requirements; anti-coincidence signal has to be generated quickly before AD conversion of the main detector starts, and also, we have to achieve lower energy threshold as much as possible.
The another important issue is the trigger timing. It could be deviated due to different timing when the signals over the threshold depending on
the pulse height or influence of the noise. We have optimized digital filter parameters and trigger timing including delay and width using prototype model of BGO crystals.
In this year, we have finally completed to fabricate the flight model of HXI/SGD, and we have performed various measurement
in the pre-flight calibrations.
We have operated all of the BGO active shields at the operational low-temperature for the first time, and confirmed that our developed signal processing system
works well even if they are assembled as the flight model sensors; we achieve the energy threshold of around 100 to 200 keV, which is comparable to that of obtained
at the component verification test, the room background of the main detector is successfully reduced by anti-coincidence as we expected, and the trigger efficiency for the
cosmic-ray event is confirmed to be almost 100%. In this contribution, we present detail of development of signal processing system of BGO-APD active shield and verification result utilizing flight model sensors.

Primary author: OHNO, Masanori (Hiroshima University)

Co-authors: Dr HARAYAMA, Atsushi (ISAS/JAXA); Ms OKADA, Chiho (Hiroshima University); Dr SATO, Goro (ISAS/JAXA); Dr UCHIYAMA, Hideki (Shizuoka University); Mr MURAKAMI, Hiroaki (University of Tokyo); Dr ODAKA, Hirokazu (ISAS/JAXA); Mr YONEDA, Hiroki (ISAS/JAXA); Dr TAKAHASHI, Hiromitsu (Hiroshima University); Prof. TAJIMA, Hiroyasu (Nagoya University STEL); Mr SHIRAKAWA, Hiroyuki (Hiroshima Univeristy); Ms EDAHIRO, Ikumi (Hiroshima Univeristy); Dr KATAOKA, Jun (Waseda University); Dr KATSUTA, Jun'ichiro (Hiroshima University); Dr HAYASHI, Katsuhiro (ISAS/JAXA); Mr MIYAKE, Katsuma (University of Tokyo); Mr OKUDA, Kazufumi (University of Tokyo); Dr NAKAZAWA, Kazuhiro (University of Tokyo); Prof. MAKISHIMA, Kazuo (University of Tokyo); Dr YAMAOKA, Kazutaka (Nagoya University STEL); Mr ONO, Koh (University of Tokyo); Dr KAWAHARADA, Madoka (JAXA); Mr KINOSHITA, Masaomi (Nagoya University STEL); Mr OHTA, Masayuki (ISAS/JAXA); Ms KATSURAGAWA, Miho (ISAS/JAXA); Dr KOKUBUN, Motohide (ISAS/JAXA); Ms OHASHI, Norie (Hiroshima University); Dr SATO, Rie (ISAS/JAXA); Mr TOMARU, Ryota (ISAS/JAXA); Dr WATANABE, Shin (ISAS/JAXA); Dr TAKEDA, Shin'ichiro (OIST); Dr SAITO, Shin'ya (Rikkyo University); Mr HABATA, Sho (Hiroshima University); Mr KOBAYASHI, Shogo (University of Tokyo); Prof. TAKAHASHI, Tadayuki (ISAS/JAXA); Mr KAWANO, Takafumi (Hiroshima University); Dr YUASA, Takayuki (RIKEN); Mr MIMURA, Taketo (Waseda University); Dr NAKANO, Toshio (University of Tokyo); Dr MIZUNO, Tsunefumi (Hiroshima University); Prof. FUKAZAWA, Yasushi (Hiroshima University); Dr TANAKA, Yasuyuki (Hiroshima University); Dr YATSU, Yoichi (TITech); Mr FURUTA, Yoshihiro (University of Tokyo); Mr UCHIDA, Yusuke (ISAS/JAXA); Mr ICHINOHE, Yuto (ISAS/JAXA); Mr KATO, Yuuichi (University of Tokyo); Ms MUROTA,

Yuuki (University of Tokyo); Mr WADA, Yuuki (University of Tokyo)

Presenter: OHNO, Masanori (Hiroshima University)

Session Classification: After dinner POSTER session, with drinks: (All presenters are requested/encouraged to attend their posters; All participants are requested to participate the session, with drinks!)

Track Classification: Applications in Space, Medical, Biology, Material Sciences