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Optical Tests of Space Telescope EXZIT for Observation of Extragalactic Background Light

Hisataka Kawasaki^{1*}, Ryo Hashimoto², Kai Ishida², Chika Matsumi², Shuji Matsuura², Kei Sano¹, Kohji Takimoto¹, Kohji Tsumura³, Hayato Yamashita²

¹Department of Space System Engineering, School of Engineering, Kyushu Institute of Technology, Fukuoka, 804-8550, Japan;

²School of Science, Kwansei Gakuin University, Sanda, Hyogo 669-1337, Japan;

³Department of Natural Science, Faculty of Science and Engineering, Tokyo City University, Setagaya, Tokyo 158-8557, Japan

*Corresponding author's e-mail: kawasaki.hisataka878@mail.kyutech.jp

Abstract: The extragalactic background light (EBL) is the integrated emission from out of our Galaxy. It contains all radiation from the cosmic evolution process. The visible to near-infrared EBL is expected to include the radiation from primordial or low-redshift objects, such as first stars or intrahalo light. To measure the EBL brightness accurately, we have to concern about the zodiacal light (ZL). The ZL is caused by sunlight scattered from the interplanetary dust in the solar system. The ZL is about ten times brighter than the EBL and it limits accuracy of the EBL measurement. EXZIT (EXo-Zodiacal Infrared Telescope) is designed to observe the visible to near-infrared EBL from deep space where the influence of the ZL is negligible. To cover wide Field of View (FoV) without degrading the size of point spread function, we made an aspherical three-mirror reflective optics with a 90 mm × 50 mm effective aperture and 16° × 8° FoV. To evaluate the optical performance, we insert parallel light on the mirror from various angles and obtain best-focus images. We create a jig to support the optics for the optical test. It is designed to reduce a distortion of the optics structure and to change angles of the optics continuously against the direction of the parallel light. The purpose of the optical test is to show the consistency with the optical design which expects the size of the best-focus image to be within 3 pix × 3 pix as an 80% diameter of encircled energy. In this talk, we report methods and results of these optical tests and future prospects from the results.

Keywords: Extragalactic background light, visible-infrared astronomy, space telescope, aspherical mirror, reflective optics, cosmology