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SMILE project: balloon experiments for observations of cosmic MeV gamma-rays

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MeV gamma-ray is a unique window for direct observation of nucleosynthesis in the universe. But there is not any big progress after COMPTEL, which was launched in 1991, because the observation in MeV gamma-ray band is obstructed by many backgrounds produced in the interaction between cosmic rays and detector materials. To open the MeV gamma-ray window, we are developing an electron-tracking Compton camera (ETCC). This ETCC consists of a gaseous electron tracker and the surrounding pixel scintillators, and it detects the momentum of incident gamma-ray with the complete construction of Compton scattering, event by event. In 2018, we launched 2nd balloon (SMILE-2+) to confirm the observation ability of celestial objects using an ETCC. Additionally, the results of SMILE-2+ suggest that the galactic diffuse gamma-ray is very bright and large spreading. In this talk, we present our SMILE project and SMILE-2+ results.

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