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Galactic Center Observation with the CTA LST Prototype

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The Galactic Center is one of the most studied regions of the sky. Of particular interest is the supermassive black hole Sagittarius A, *whose proximity provides an opportunity for morphological investigations into the acceleration of cosmic rays in an extreme environment. Previous observations with very-high-energy gamma rays, in particular the detection of a diffuse emission component on a scale of hundreds of parsecs, suggest a potential connection between the extended emission and the black hole. However, the limited sensitivity and angular resolution of current telescopes hinder a definitive confirmation of this connection. To gain further insights into this important but complex region, more in-depth spectral and morphological studies, built upon deeper and wider observations with next-generation instruments including the Cherenkov Telescope Array (CTA), are required. Currently, Large-Sized Telescope prototype (LST-1) for CTA is under commissioning. Looking ahead to the forthcoming CTA Observatory, we employ the newly developed analysis chain and analyze about 40 hours of data from Galactic Center observations with LST-1 in 2021 and 2022. We detect Sagittarius A* and SNR G0.9+0.1, and obtain their spectral energy distributions consistent with the results from the current telescopes, with a broad energy coverage owing to the large-zenith-angle observation and the low energy threshold of LST-1.

Primary author: ABE, Shotaro (Institute for Cosmic Ray Research, University of Tokyo)

Co-authors: VOVK, Ievgen (ICRR, University of Tokyo); STRZYS, Marcel (ICRR, University of Tokyo); DIB, Marion (University and INFN Padova); TESHIMA, Masahiro (Max-Planck-Institut für Physik); DORO, Michele (University and INFN Padova); INADA, Tomohiro (ICRR, University of Tokyo); OHTANI, Yoshiki (ICRR, University of Tokyo)

Presenter: ABE, Shotaro (Institute for Cosmic Ray Research, University of Tokyo)

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