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## **Development and observation experiments of the high spatial resolution muon tomography prototypes based on Micromegas detectors**

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Muon ( $\mu$ ) tomography imaging technology, as an important supplement to existing technologies such as X-ray and neutron imaging, has a wide range of important applications in fields such as natural disaster warning, mineral exploration, as well as interdisciplinary fields such as geology and archaeology. MPGD based muon track detection is one of the important technical schemes for high-resolution muon imaging research. The research group at the USTC has developed small ( $150\text{mm} \times 150\text{mm}$ ) and large area ( $400\text{mm} \times 400\text{mm}$ ) scattering and transmission imaging device prototypes ( $\mu$ STC:  $\mu$ (muon) Scattering tomography & Transmission imaging faCility) with X-Y two-dimensional readout, using thermal bonding Micromegas detectors, AGET readout electronics, and encoding readout circuits. Imaging observation experiments were also carried out on high-z samples (tungsten, lead, etc.), subway tunnels, and an ancient volcano (Hefei Dashushan). In 2022, the research group conducted observation experiments on the geological structure of the upper layer of the subway tunnel and the structure of the ancient volcano. During the test period, the prototype operated normally in a construction environment with a large amount of dust and water vapor, as well as strong vibrations, which verified its adaptability to complex environments. In the observation experiment of the ancient volcano, the prototype was placed in a van, and the experiment equipment could be operated and monitored remotely in the laboratory through 4G network and a camera. Currently, more than three months of continuous operation and data acquisition have been completed, and the system stability has been further verified. The imaging results will be also presented.

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