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Fast X-ray variability of radio galaxy M87

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M87 is one of the nearest radio galaxy. We can study the core, jet, and some components by radio to X-ray observations.

Regarding TeV gamma ray observations, it is known to show an intra-day variability.

Such fast variability may occur at the particle acceleration region. But due to rough angular resolution, we cannot know which component causes this variability.

We searched for fast X-ray variability of the M87 from long-exposure X-ray archive data. As a result, we found an intra-day variability during Suzaku/XIS data in 2006.

Suzaku/XIS cannot resolve each component, but HST-1 was the brightest component in the X-ray band in this period; core had 1/4 of HST-1 flux.

Therefore, this variability possibly comes from HST-1, but we cannot rule out the possibility of large core variability.

A soft photon index > 2.0 in the X-ray band indicates that variability component is synchrotron emission from accelerated electrons in HST-1 or core.

In addition, we also find a possible variability of core on the Chandra/HRC observation in 2017.

In this period, NuSTAR X-ray spectra have a power law with a photon index of 1.8, and thus not likely a synchrotron spectrum from the jet. Here the X-ray emission from the core was dominant in this period.

Also, we find that one NuSTAR observation showed a higher flux than other NuSTAR observations by a factor of 2.5.

From these results, both core and HST-1 can be the origin of the X-ray variability.

We will discuss the variability site and emission mechanism.

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Experimental Results

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