

# Multiwavelength variability and correlation studies of Mrk421 during historically low X-ray and $\gamma$ -ray activity in 2015–2016

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## What is this contribution about?

Studying Mrk421 in a low flux state, which revealed many interesting results about variability and correlation.

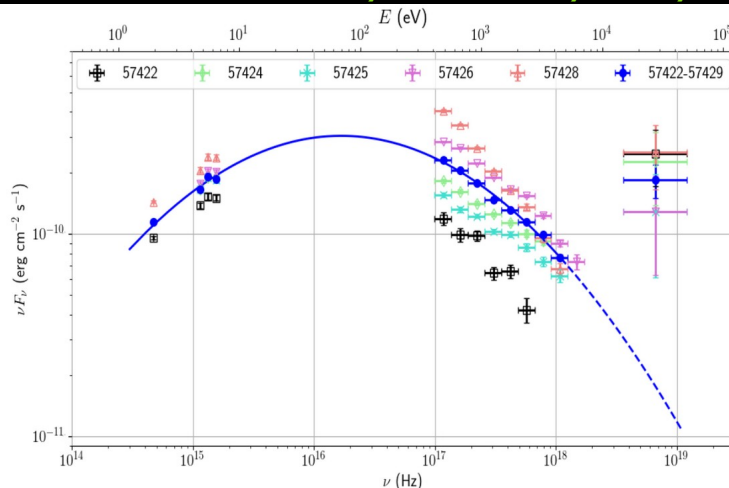
We also integrated data from previous campaigns to make a rich data sample to substantiate observations from our study of correlation and flux distribution.

## Why is it relevant/ interesting?

Mrk421 has been studied at VHE and X-rays for 30 years, but we are still far from understanding how it works. This lack of knowledge applies particularly to the non-flaring periods

The very densely sampled data gives us a rare opportunity to study the source in a low flux states which is rarely studied.

## Acciari et al. 2021, MNRAS, 504, 1427



Recorded the lowest X-ray and VHE gamma-ray flux during 2015-2016.

A radio flare with flux doubling time around 21 days which may be due to the kink instability.

We detected the hard X-ray excess which may be due to the emergence of a new spectral component or the rising part of the IC hump.

We see flattening of the hardness ratio vs. flux in the VHE gamma-rays.

Significant correlation between radio vs. HE gamma-rays (and optical) at around 45-d.

Flux distribution study suggests lognormality which hints to a multiplicative process responsible for jet variability.

## What have we done?

Studied variability and correlation with fractional variability and hardness ratio.

Performed simulations to claim the significance of the correlation.

Devised two new methods to understand the flux distribution which does not depend on the flux binning and takes into account the flux uncertainty.

## What is the result?