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Multi-band variability and correlation study of the extraordinary Mrk421 flare in April 2013

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The blazar Mrk 421 is one of the closest and brightest extragalactic very high energy (VHE, >100 GeV) gamma-ray emitters, and hence one of the VHE objects that we can study best. Since 2009, Mrk 421 is yearly observed during 6 months with more than 25 instruments in the framework of broadband multifrequency campaigns. During April 2013, Mrk421 underwent unprecedented flaring activity in many wavelengths, which was densely monitored at VHE by MAGIC and VERITAS (up to fluxes of the order of ˜18 Crab Units above 800 GeV), in the hard X-rays by NuSTAR, in the soft X-rays by Swift-XRT, and by numerous optical facilities. The high sensitivity of the instruments involved, together with the ˜45 hours of strictly simultaneous observations in the VHE and X-ray energy bands during the entire period of the flare (i.e. 10 consecutive days), make this dataset an unique opportunity for unveiling the highly energetic emission on sub-hour timescales. Here we perform detailed correlations studies and an exquisite characterization of the multi-band flux variability of the source. We will also discuss the origin of the VHE emission with our new results.

Primary author: Mr BORRACCI, Francesco (Max Planck Institute for Physics (MAGIC Telescopes))

Co-authors: Dr FURNISS, Amy (University of California); ON BEHALF OF FERMI-LAT, MAGIC, VERITAS COLLABORATIONS, And MW partners (Many affiliations); Dr PANEQUE, David (Max Planck Istitute for Physics); Dr PERRI, Matteo (Osservatorio Astrofisico di Roma); Mr BALOKOVIC, Mislav (University of California)

Presenter: Mr BORRACCI, Francesco (Max Planck Institute for Physics (MAGIC Telescopes))

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