

## Dissecting the long-term emission behaviour of the BL Lac object Mrk 421

Carnerero M., Raiteri C., Villata M., Acosta-Pulido J., Larionov V., Smith P., D'Ammando F., Agudo I., Arévalo M., Bachev R., Barnes J., Boeva S., Bozhilov V., Carosati D., Casadio C., Chen W., Damjanovic G., Eswaraiyah E., Forné E., Gantchev G., Gómez J., González-Morales P., Griñón-Marín A., Grishina T., Holden M., Ibryamov S., Joner M., Jordan B., Jorstad S., Joshi M., Kopatskaya E., Koptelova E., Kurtanidze O., Kurtanidze S., Larionova E., Larionova L., Latev G., Lázaro C., Ligustri R., Lin H., Marscher A., Martínez-Lombilla C., McBreen B., Mihov B., Molina S., Moody J., Morozova D., Nikolashvili M., Nilsson K., Ovcharov E., Pace C., Panwar N., Pastor Yabar A., Pearson R., Pinna F., Protasio C., Rizzi N., Redondo-Lorenzo F., Rodríguez-Coira G., Ros J., Sadun A., Savchenko S., Semkov E., Slavcheva-Mihova L., Smith N., Strigachev A., Troitskaya Y., Troitsky I., Vasilyev A., Vince O.

*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

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### Abstract

© 2017 The Authors Published by Oxford University Press on behalf of the Royal Astronomical Society. We report on long-term multiwavelength monitoring of blazar Mrk 421 by the GLAST-AGILE Support Program of the Whole Earth Blazar Telescope (GASP-WEBT) collaboration and Steward Observatory, and by the Swift and Fermi satellites. We study the source behaviour in the period 2007-2015, characterized by several extreme flares. The ratio between the optical, X-ray and  $\gamma$ -ray fluxes is very variable. The  $\gamma$ -ray flux variations show a fair correlation with the optical ones starting from 2012. We analyse spectropolarimetric data and find wavelength-dependence of the polarization degree (P), which is compatible with the presence of the host galaxy, and no wavelength dependence of the electric vector polarization angle (EVPA). Optical polarimetry shows a lack of simple correlation between P and flux and wide rotations of the EVPA. We build broad-band spectral energy distributions with simultaneous near-infrared and optical data from the GASP-WEBT and ultraviolet and X-ray data from the Swift satellite. They show strong variability in both flux and X-ray spectral shape and suggest a shift of the synchrotron peak up to a factor of  $\sim 50$  in frequency. The interpretation of the flux and spectral variability is compatible with jet models including at least two emitting regions that can change their orientation with respect to the line of sight.

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### Keywords

BL Lacertae objects: general, BL Lacertae objects: individual: Mrk 421, galaxies: active, galaxies: jets

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