

Rapid variability at very high energies in Mrk 501

Nachiketa Chakraborty^{*a †}, **Gabriele Cologna**^{b‡}, **Max Anton Kastendieck**^c, **Frank Rieger**^d, **Carlo Romoli**^e, **Stefan J. Wagner**^b, **Agnieszka Jacholkowska**^f, **Andrew Taylor**^d **for the H.E.S.S. Collaboration**

^a *Max-Planck-Institut für Kernphysik, Saupfercheckweg 1, 69117 Heidelberg, Germany*

^b *Landessternwarte, Universität Heidelberg, Königstuhl, 69117 Heidelberg, Germany*

^c *Universität Hamburg, Institut für Experimentalphysik, Luruper Chaussee 149, D 22761 Hamburg, Germany*

^d *ITA Universität Heidelberg and Max-Planck-Institut für Kernphysik, Heidelberg, Germany*

^e *Dublin Institute for Advanced Studies, 31 Fitzwilliam Place, Dublin 2, Ireland*

^f *LPNHE, Université Pierre et Marie Curie Paris 6, Université Denis Diderot Paris 7, CNRS/IN2P3, 4 Place Jussieu, F-75252, Paris Cedex 5, France*

Email: cnachi@mpi-hd.mpg.de

A major flaring state of the BL Lac object Mrk 501 was observed by the High Energy Stereoscopic System (H.E.S.S.) in June, 2014. Flux levels higher than one Crab unit were recorded and rapid variability at very high energies ($\sim 2\text{-}20$ TeV) was revealed. The high statistics afforded by the flares allowed us to probe the presence of minutes timescale variability and study its statistical characteristics exclusively at TeV energies owing to the high energy threshold of approximately 2 TeV. Doubling times of a few minutes are estimated for fluxes greater than 2 TeV. Statistical tests on the light curves show interesting temporal structure in the variations including deviations from a normal flux distribution similar to those found in the PKS 2155-304 flare of July 2006, at nearly an order of magnitude higher threshold energy. Rapid variations at such high energies put strong constraints on the physical mechanisms in the blazar jet.

*The 34th International Cosmic Ray Conference,
30 July- 6 August, 2015
The Hague, The Netherlands*

*Speaker.

†Fellow of the Alexander von Humboldt Foundation

‡Member of the International Max Planck Research School for Astronomy and Cosmic Physics at the University of Heidelberg (IMPRS-HD) and the Heidelberg Graduate School of Fundamental Physics (HGSFP).