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Synchrotron emission from the blazar PG 1553+113. An analysis of its flux and polarization variability

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Abstract

© 2016 The Authors. In 2015 July 29-September 1, the satellite XMM-Newton pointed at the BL Lac object PG 1553+133 six times, collecting data for 218 h. During one of these epochs, simultaneous observations by the Swift satellite were requested to compare the results of the X-ray and optical-UV instruments. Optical, near-infrared and radio monitoring was carried out by the Whole Earth Blazar Telescope (WEBT) collaboration for the whole observing season. We here present the results of the analysis of all these data, together with an investigation of the source photometric and polarimetric behaviour over the last 3 yr. The 2015 EPIC spectra show slight curvature and the corresponding light curves display fast X-ray variability with a time-scale of the order of 1 h. In contrast to previous results, during the brightest X-ray states detected in 2015 the simple log-parabolic model that best fits the XMM-Newton data also reproduces reasonably well the whole synchrotron bump, suggesting a peak in the near-UV band. We found evidence of a wide rotation of the polarization angle in 2014, when the polarization degree was variable, but the flux remained almost constant. This is difficult to interpret with deterministic jet emission models, while it can be easily reproduced by assuming some turbulence of the magnetic field.

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Keywords

BL Lacertae objects: general, BL Lacertae objects: individual: PG 1553+113, Galaxies: active

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