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The Second Strong X-Ray Flare in the TeV-detected Blazar 1S 1959+650

The nearby TeV-detected blazar 1ES 1959+650 is one of the bright sources in the X-ray sky and a frequent target of X-ray Telescope onboard the Swift satellite. It has shown two exceptionally two strong and prolonged X-ray flaring activities during the one year period since 2015 August compared to those observed in previous years. During these flares, long lasting X-ray states was superimposed by fast strong flares showing the 0.3-10 keV count rate higher than 20 cts/s many times and making 1ES 1959+650 the third blazar exceeding this level (after Mrk 421 and Mrk 501). The second flare occurred during 2016 June-August and, in average, exhibited higher X-ray state compared to the first one observed during 2015 August - 2016 January, and it often was characterized by very hard spectra with the photon index smaller than 1.70 which is expected in the framework of some hadronic scenarios. During the second flare, the position of the synchrotron SED peak was mostly observed at the energies larger than 2 keV (a rare occasion among blazars), and it was shifted beyond 10 keV since the start of X-ray observations of this source. The spectral curvature was mostly below the value $b=0.35$, expected in the case of an effective stochastic acceleration of X-ray emitting electrons near the shock front moving downstream the jet, while this mechanism seems to be less effective during the first flare when the curvature parameter generally was significantly larger.

Primary author(s) : Dr. KAPANADZE, Bidzina (Ilia Sate University, Tbilisi, Georgia); Dr. DORNER, Daniela (Universität Würzburg)

Presenter(s) : Dr. DORNER, Daniela (Universität Würzburg)

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