

ASTROPHYSICS SEMINAR

Friday, 3 February 2012 at 11:00

Fermi observation of blazars and implications for the origin of the gamma-ray emission

Juri Poutanen

University of Oulu, Finland

Abstract. Fermi Gamma-ray Space Telescope has detected hundreds of AGNs, most of them are blazars. Spectra of blazars show clear correlation with the luminosity confirming the blazar sequence. Interestingly, the GeV spectra of the brightest blazars cannot be described by a simple power law model or any smoothly curved models. A much better description is obtained with a broken power law, with the break energies of a few GeV. The sharpness and the position of the breaks can be well reproduced by absorption of gamma-rays via photon-photon pair production on He II and H I Lyman recombination continuum (LyC) and lines. This is the first direct observational proof that the blazar zone lies close to the broad-line region within a few light-months from a super-massive black hole. We also study spectral variability during flares of the brightest blazar 3C 454.3 and discover anti-correlation between the column density of the He II LyC and flux. This implies that the gamma-ray emission zone lies close to the boundary of the high-ionization part of the broad-line region and moves away from the black hole when the flux increases. Identification of the gamma-ray production with the relativistic jet, implies that the jet is already accelerated at sub-parsec distances from the central black hole, which favours the Blandford-Znajek process as the jet launching mechanism.

Additional Information

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