ABSTRACT: Following gamma-ray flaring activity of high-redshift (z=2.218) blazar 0836+710 in 2011, we have assembled a long-term multiwavelength study of this object. Although this source is monitored regularly by radio telescopes and the Fermi Large Area Telescope, its coverage at other wavelengths is limited. The optical flux appears generally correlated with the gamma-ray flux, while little variability has been seen at X-ray energies. The gamma-ray/radio correlation is complex compared to some other blazars. As for many blazars, the largest variability is seen at gamma-ray wavelengths.

**Introduction**

0836+710 is a luminous, high-redshift (z=2.218) quasar of the blazar subclass. It is also known as 4C71.07 and is characterized by a flat radio spectrum (α=-0.33, Kühr 1981). This source hosts a powerful radio jet emerging from the core and extending up to kpc scales (Hummel et al. 1992). VLBI (Very Long Baseline Interferometry) images of 0836+710 show a very complex motion pattern, with one-sided jet components moving from apparent subluminal (β app ≈ 0.5) to superluminal (β app > 25) velocities (β = v/c, H = 71 km/s/Mpc) (Oettner 1998; Lister et al. 2009).

Temporal Behavior

We divided the observations into two time periods: a quiescent period from 2008 August to 2010 August (matching the 2FGL catalog analysis), and an active period from 2011 March to 2012 January. The weekly light curves in Figure 1 show the integrated flux (E > 100 MeV).

**Gamma-Ray Observations**

During the Compton Observatory era, 0836+710 was detected by COMPTEL (3-10 MeV band, Collmar 2006) and EGRET (Thompson et al. 1993; SEG J0845+7049, Hartman et al. 1999). This source was not bright enough to be included in the Fermi-LAT Bright Source List (Abdo et al. 2009); however, it was associated with 1FGL J0842.2+7054 in the First LAT Catalog (1FGL, Abdo et al. 2010). Its 2FGL name is J0842.6+7052, which includes in the Fermi-LAT Bright Source List (Abdo et al. 2010a), a component for the Galactic diffuse emission (gll_iem_v02.fit), and an isotropic component (diffuse_0836+710) and a region of the sky with TS > 4 was required for a detection. Although the LAT observations are continuous, weeks in which TS < 4 were not included. The source variability is shown with 1 week-time binning and an integral flux F(E>100 MeV). A Test Statistic (TS) of 25 was required for a detection. The source was detected in the Swift/X-Ray Telescope during the Compton Observatory era, but coverage is not good enough for a detailed cross-correlation analysis before the 2011 flares.

**Spectral Energy Distribution (SED)**

The spectral analyses were performed using binned (for the quiescent period) and unbinned (for the active period) maximum-likelihood estimators (gllkpart). In the analysis, 0836+710 was detected with a statistical significance of approximately 19σ and an integral flux F(E=100 MeV) of 6.29×10^{-6} cm^{-2} s^{-1} for the quiescent state. During the active state, flares a, b, and c showed flux F(E=100 MeV) in the same units of 2.41×10^{-6} (170), 2.51×10^{-6} (115), and 6.45×10^{-6} (360), respectively. For all time intervals except flare e, the spectrum is well fit by a power law. During flare c, spectral curvature is visible (as represented in Figure 3). A detailed spectral analysis during this time interval showed a reduced χ^2 of 2.85 for a power-law fit, while a log-parabola fit produced a reduced χ^2 of 0.89.

**Long-Term Multiwavelength Light Curve**

Although 0836+710 is monitored regularly by radio telescopes, its coverage at other wavelengths is limited. The optical flux appears generally correlated with the gamma-ray flux, while little variability has been seen at X-ray energies. The gamma-ray/radio correlation is complex compared to some other blazars. As for many blazars, the largest variability is seen at gamma-ray wavelengths.

**High-redshift blazar 0836+710 multiwavelength variability exhibits some complex features. The largest variability is seen at gamma-ray wavelengths.**