The flat spectrum radio quasar 4C 38.41 showed a significant increase of its radio flux density during the period 2012 March - 2015 August which correlates with gamma-ray flaring activity. Multi-frequency simultaneous VLBI observations were conducted as part of the interferometric monitoring of gamma-ray bright active galactic nuclei (IMOGABA) program and supplemented with additional monitoring observations at various bands across the electromagnetic spectrum. The epochs of the maxima for the two largest gamma-ray flares coincide with the ejection of two respective new VLBI components and the evolution of the physical properties seem to be in agreement with the shock-in-jet model. Derived synchrotron self absorption magnetic fields, indicating that the source of the flare may be associated with a particle dominated emitting region.

**Light curve of 4C 38.41.** Horizontal dotted lines show flux threshold (median+3rms in flux density). High flux densities, more than twice as large as usual, are observed in radio bands between MJD 56200 and MJD 56700. The associated optical, X-ray, and γ-ray fluxes seem to follow a similar trend, although for optical and X-rays, the poor sampling complicates the comparison. Moreover, a clear flux peak seen in these bands at MJD 57050 is not visible in any radio band.

**Cross-correlation analysis** shows the flux in the different bands to be significantly correlated, with the possible exception of optical bands, where the correlation, while still present, is not statistically significant (<95%). Analysis of the DCF suggests time lags smaller than the uncertainty in the peak of the DCF among radio frequencies, as well as among high energies (optical, X-rays, and γ-rays), whereas a time lag of about 70-90 days is found between radio and high-energy bands, suggesting that the emissions at high energies and in radio bands are produced in two different jet regions, with the γ-rays located at 1±13 pc and radio emission at 40±13 pc from the jet apex.

**Resolved components** by the BU 43 GHz VLBI data are found to be moving away from the core. Two of them, C2 and C3, with speeds of 10.2±0.8 and 11.7±1.6c, have extrapolated ejection epochs MJD=56520±30 and MJD=56185±30, respectively, which fall well within the epochs for which the largest γ-rays were observed. This seems to indicate that the γ-ray flaring is tightly associated with the ejection of these components. There are no radio structural changes associated with the dimmer γ-rays, and the reported flaring activity in the source can simply be explained by radiative processes having a constant Doppler factor.

**Conclusions:**

4C 38.41 showed an increase of its radio flux density correlated with γ-ray flares with radio enhancement following that of high energies by about 70-90 days. This phenomena can be associated with the ejecta of new components from a particle dominated region, becoming visible as radiation reaches optically thin regions.

Follow-up of the components location, speed, flux density and turnover frequency show that emission is in agreement with the shock-in-jet model adiabatically expanding with a constant Doppler factor.

**References:**