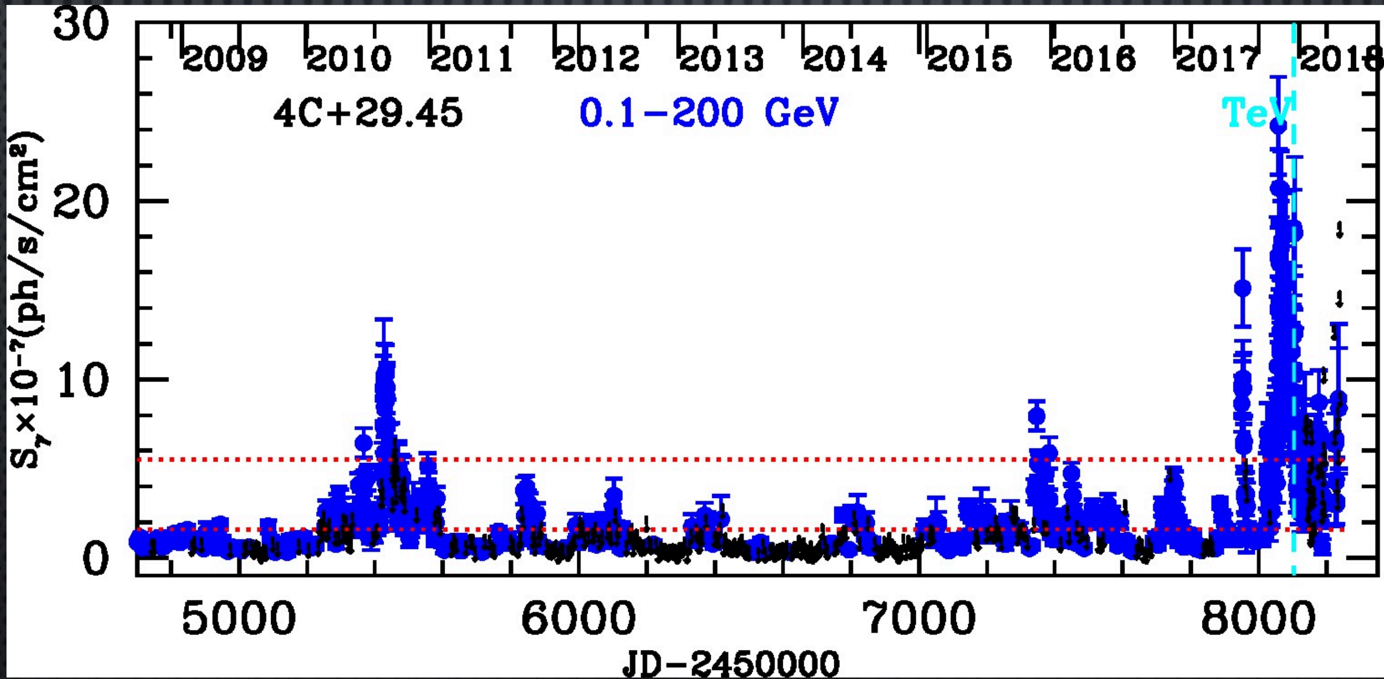
Dramatic Multi-Wavelength Outburst of the Quasar 4C+29.45 at the End of 2017

Svetlana Jorstad
Boston University, USA; St.Petersburg University, Russia



OUTLINE

I. MW Light Curves
II. Jet Structure and Parsec-Scale Jet Kinematics
III.Polarization Properties
IV. Optical Emission Line Spectra
V. Duscussion

COLLABORATORS

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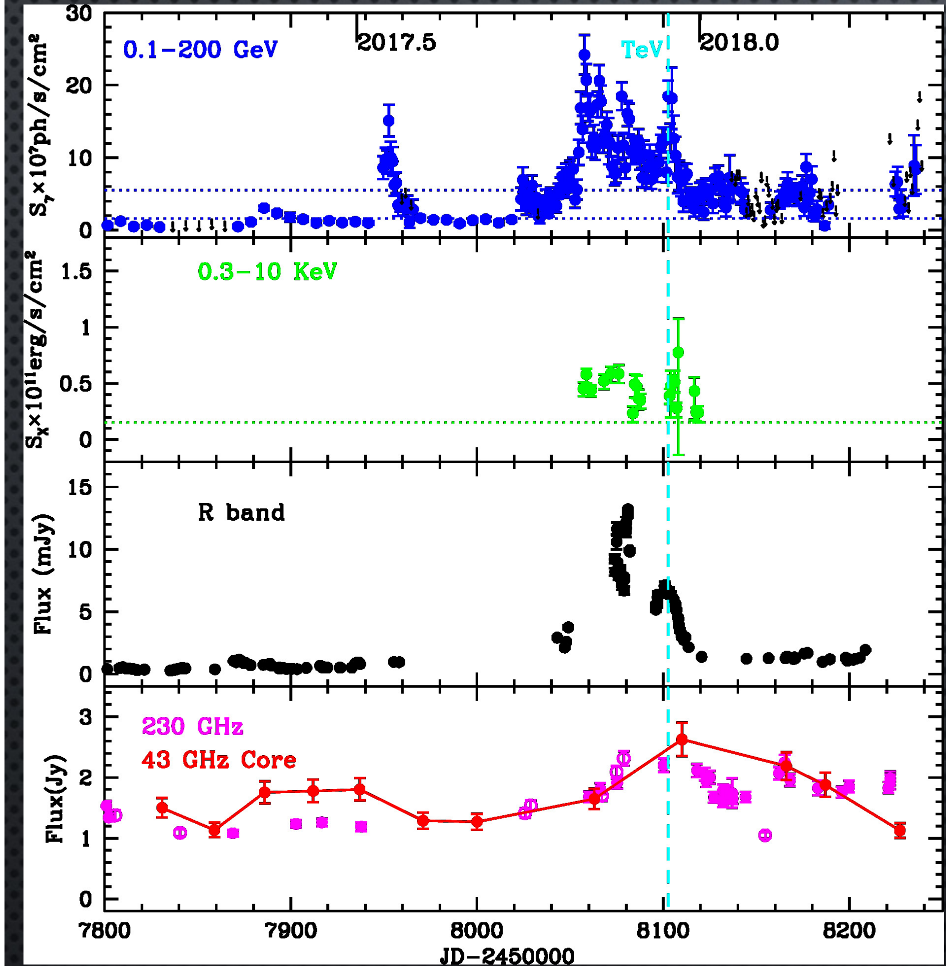
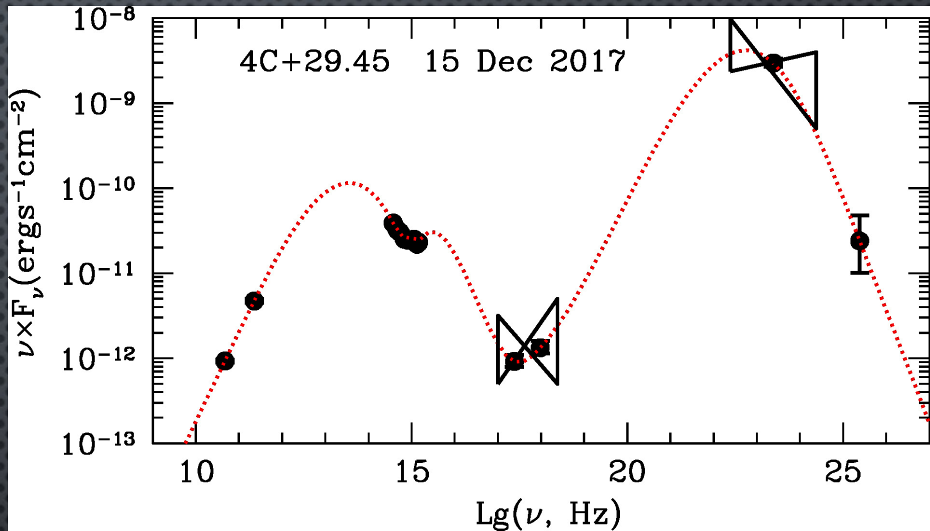
MULTI-WAVELENGTH LIGHT CURVES OF 4C+29.45 (1156+295, TON 0599), Z=0.729





The VHE flux ~1.5×10^{-10} ph/cm^2/s at >100 GeV

(Atel## 11061, 11075)

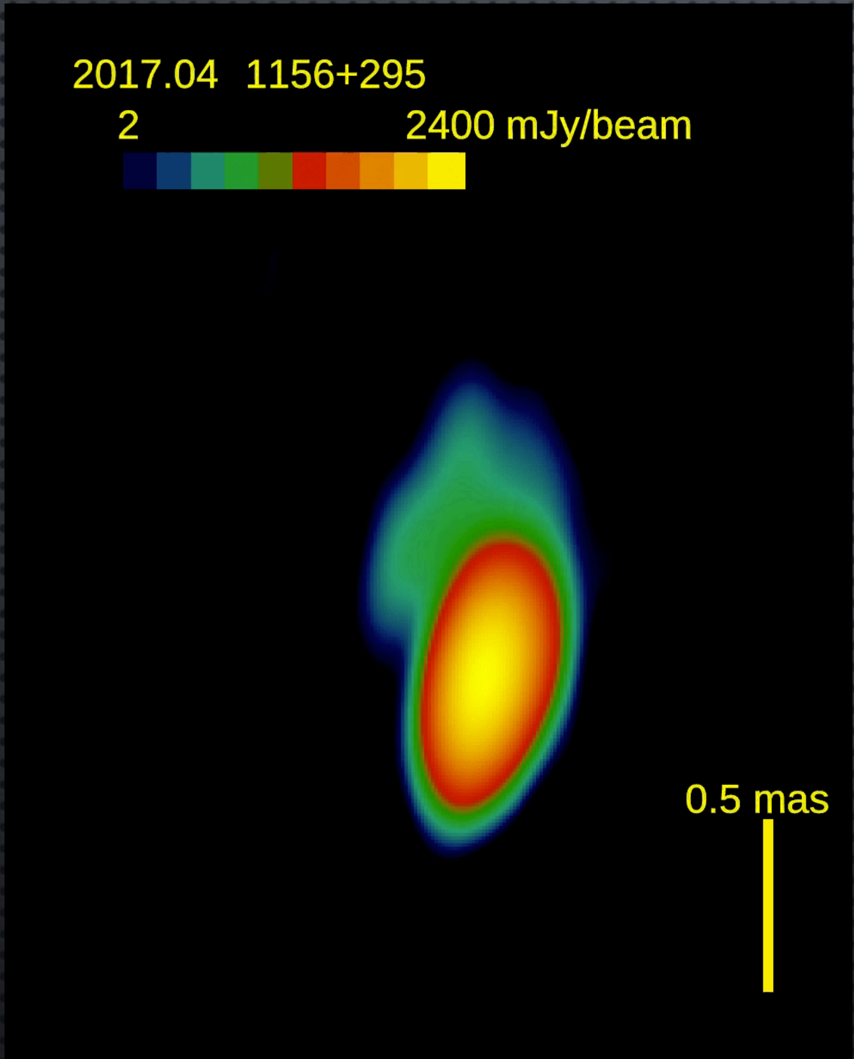
L_{1GeV} ~ 1.7×10^{48} erg/s

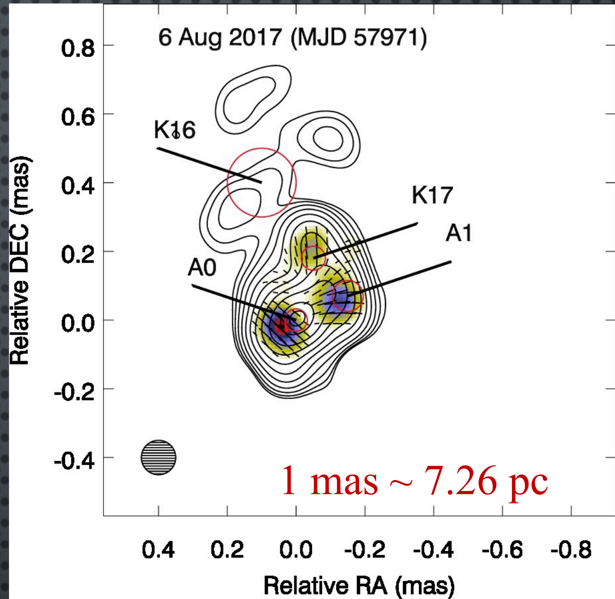
$\Gamma_{0.1\text{-}10GeV}=2.01\pm0.08$

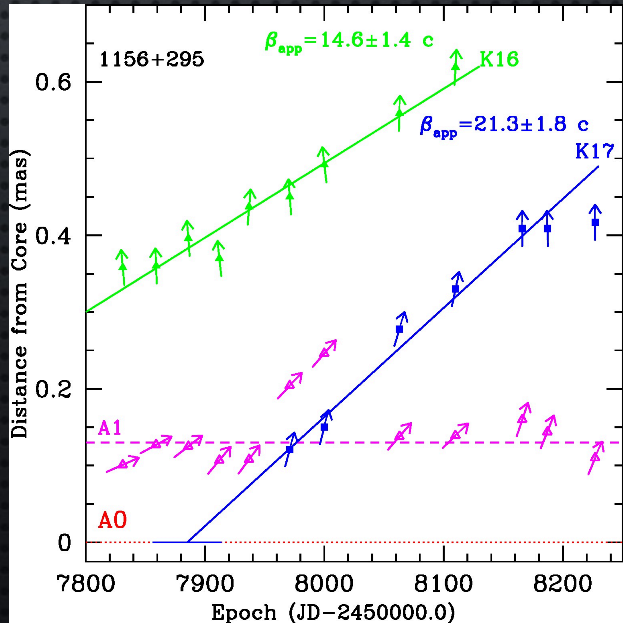
$\Gamma_{0.13\text{-}10KeV}=1.71\pm0.16$

$\alpha_{opt} = 1.53\pm0.05$

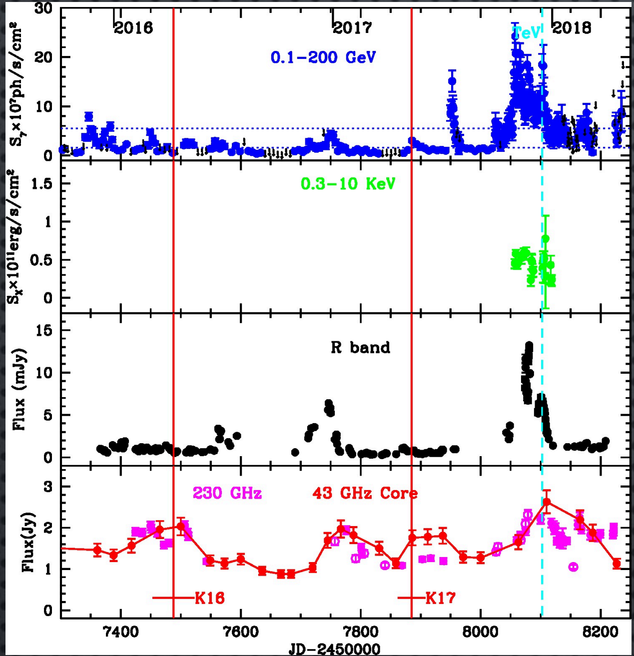
ANALYSIS OF VLBA DATA OF 4C+29.45 AT 43 GHZ FROM 2017 JANUARY TO 2018 APRIL

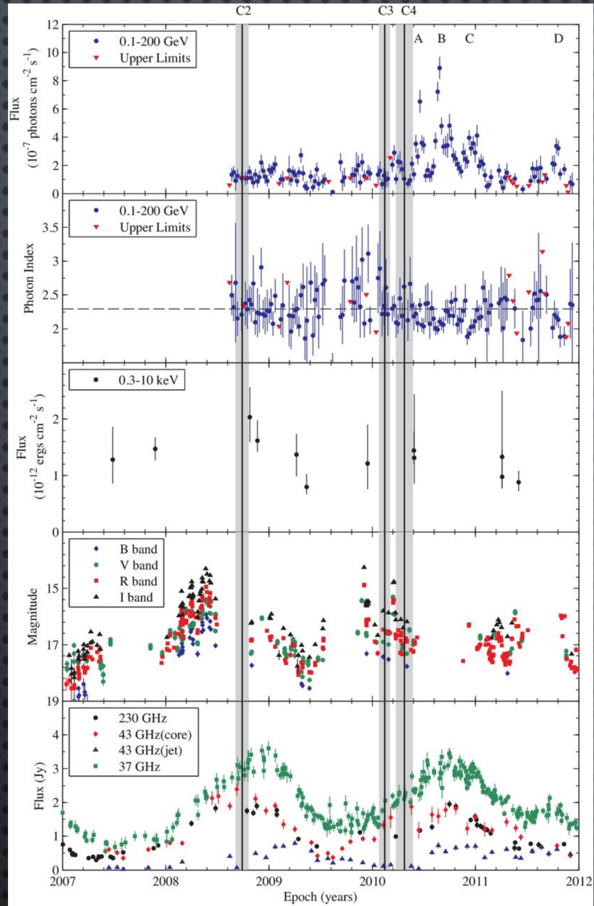


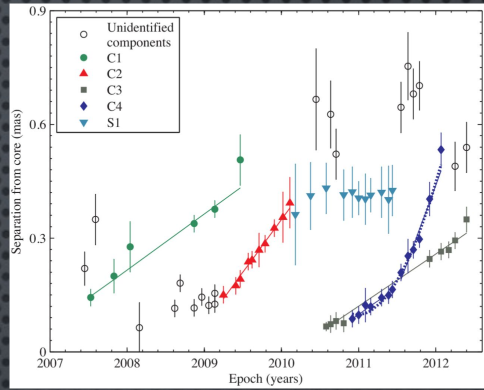


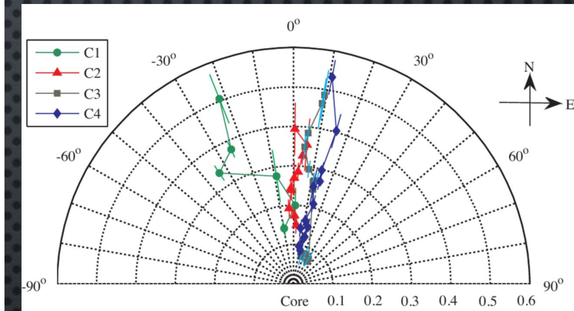


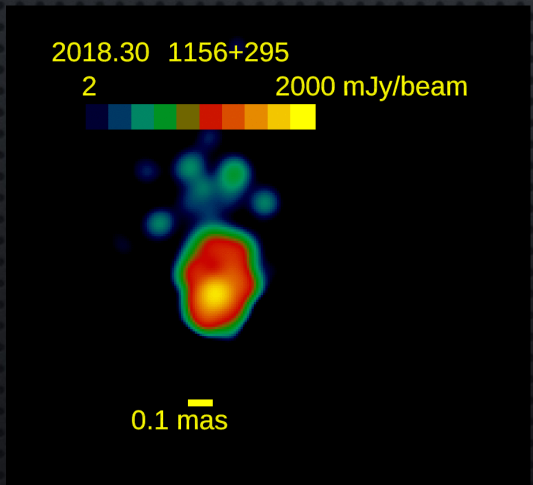
TIMING BETWEEN JET EVENTS AND GAMMA-RAY ACTIVITY







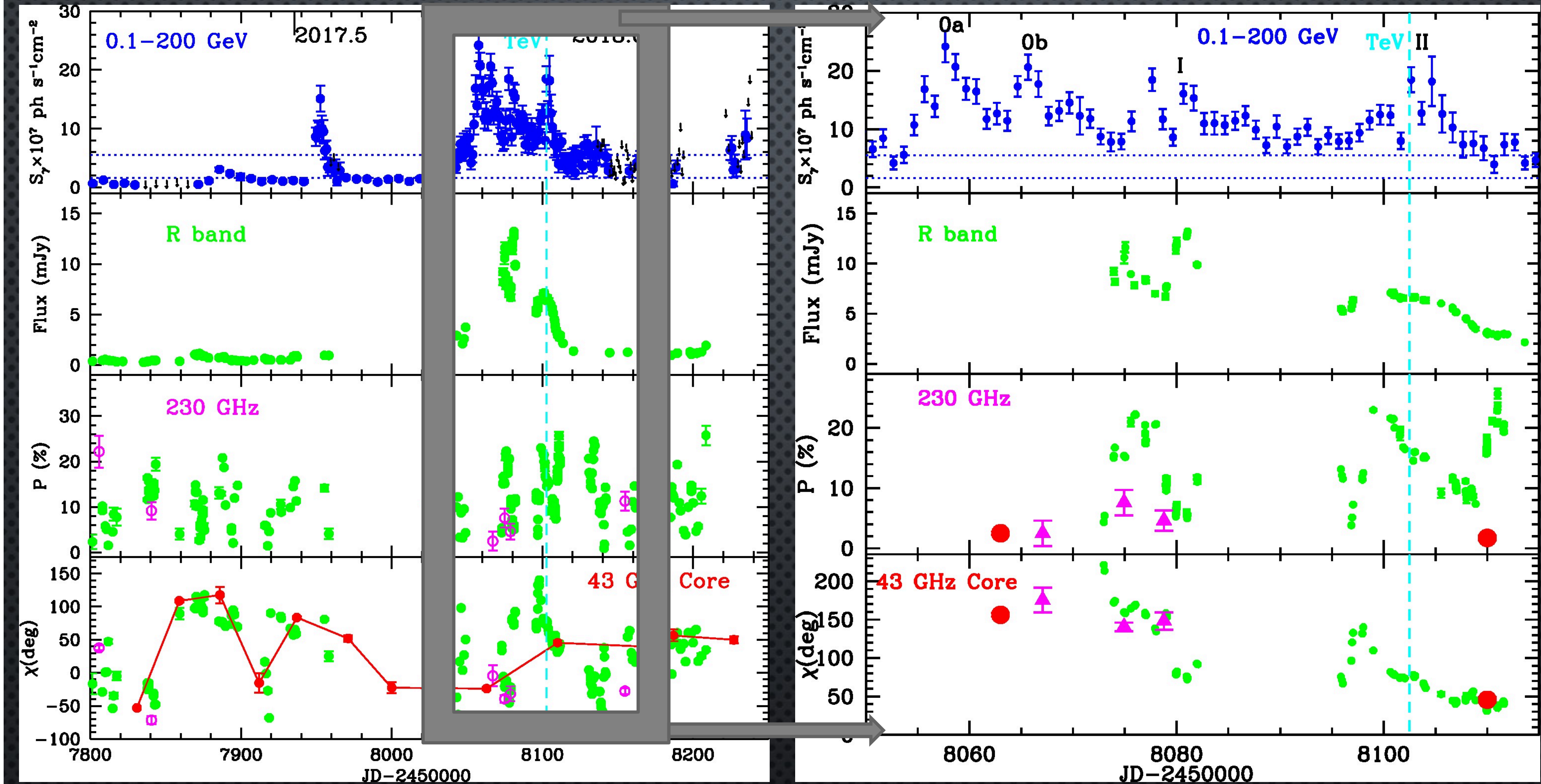




Ramakrishnan et a. 2014

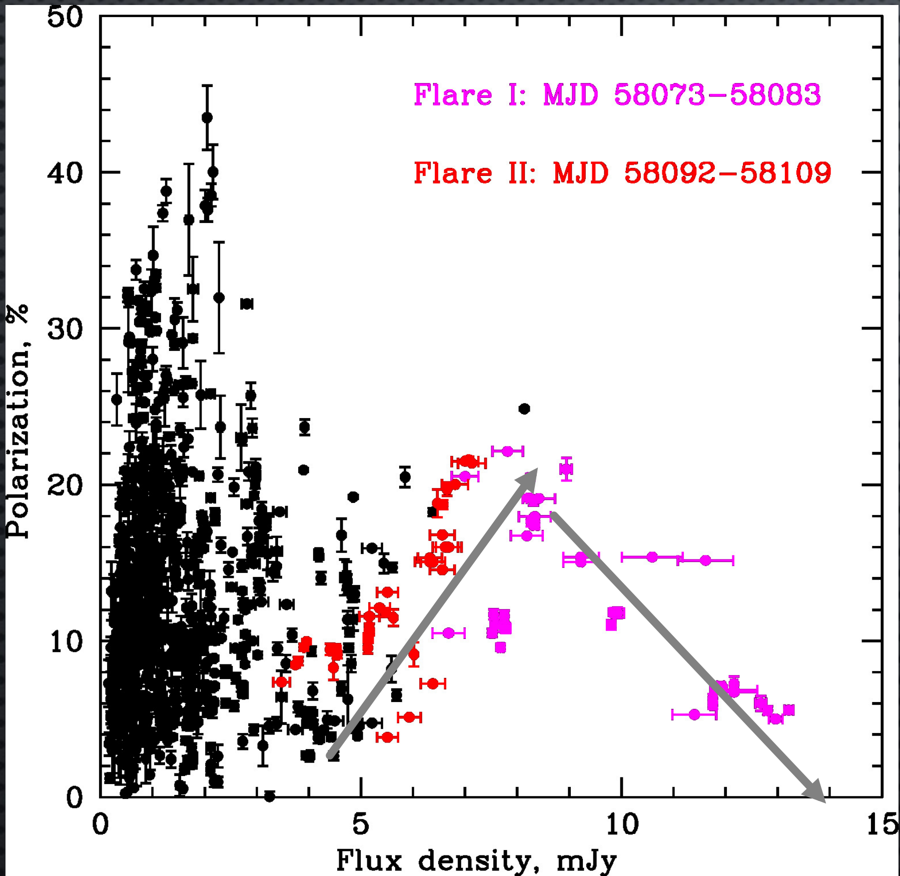
Lorentz and Doppler factors: $\Gamma \approx \delta \approx 20$
Viewing angle: $\theta_o \approx 1^o$
Jorstad et al. 2017

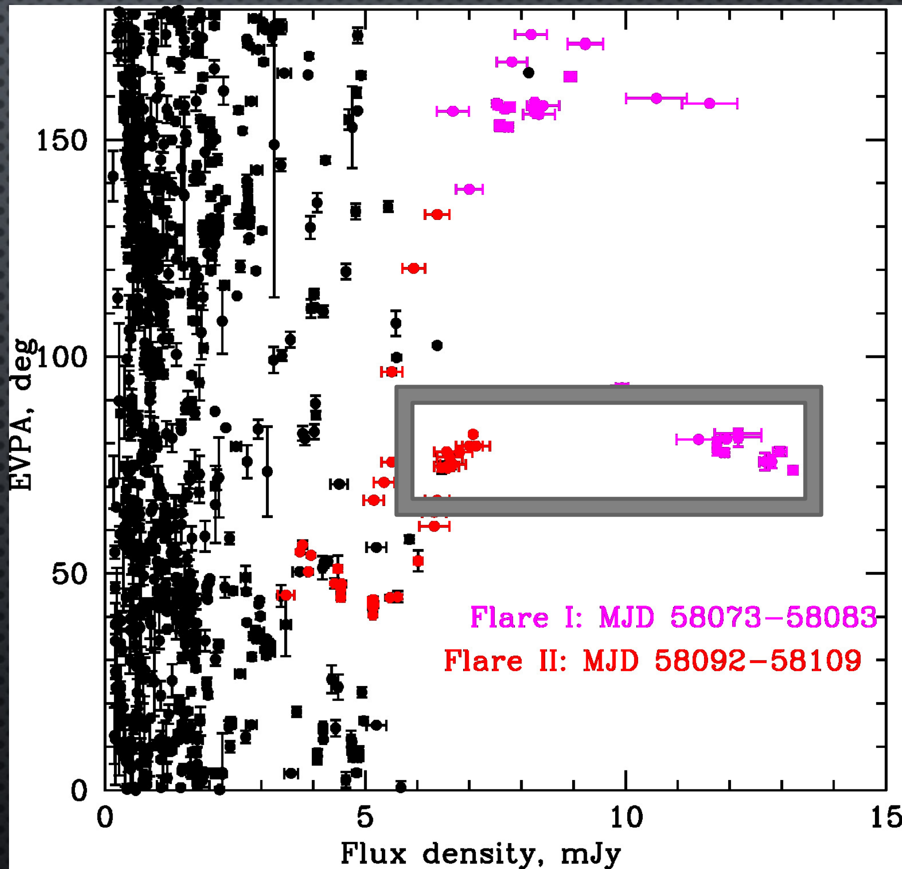
POLARIZATION BEHAVIOR



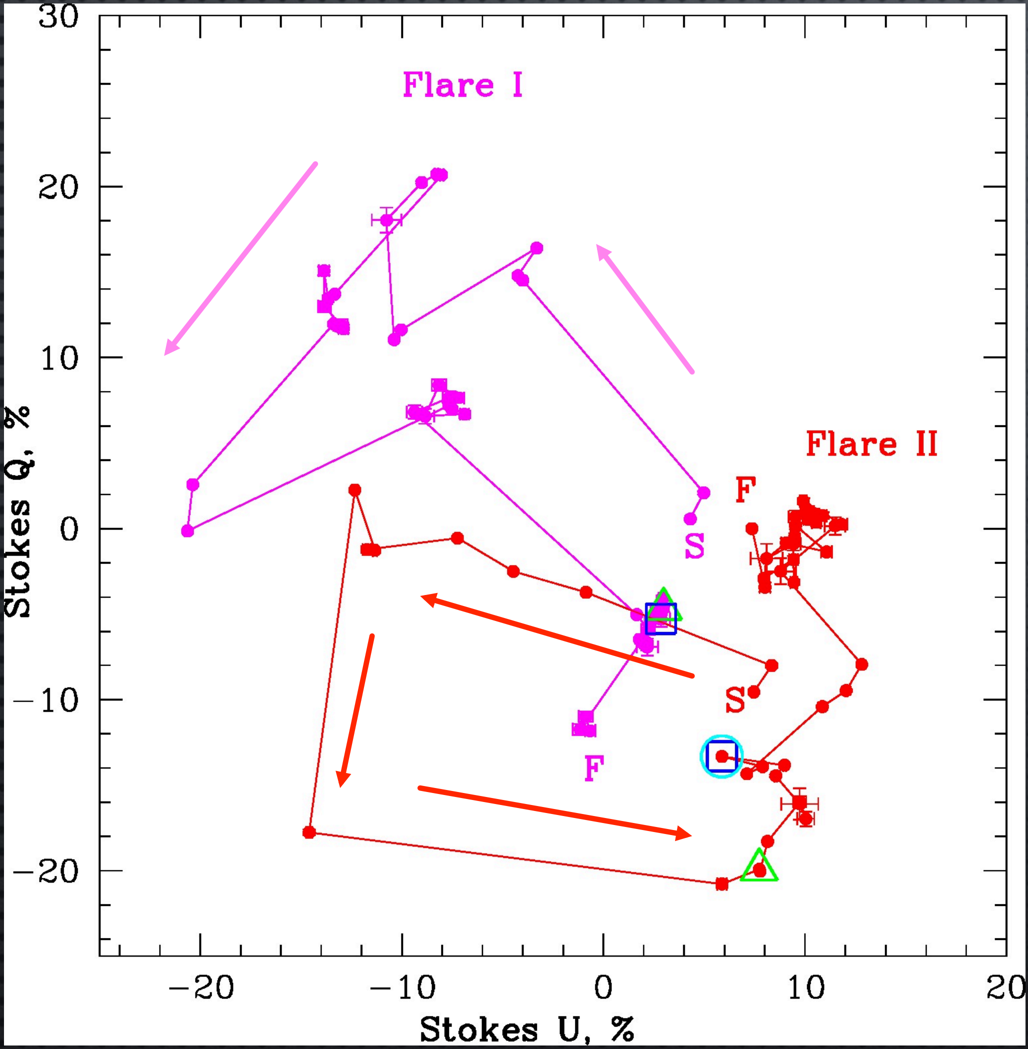
POLARIZATION AT ACTIVE VS. QUIESCENT STATES

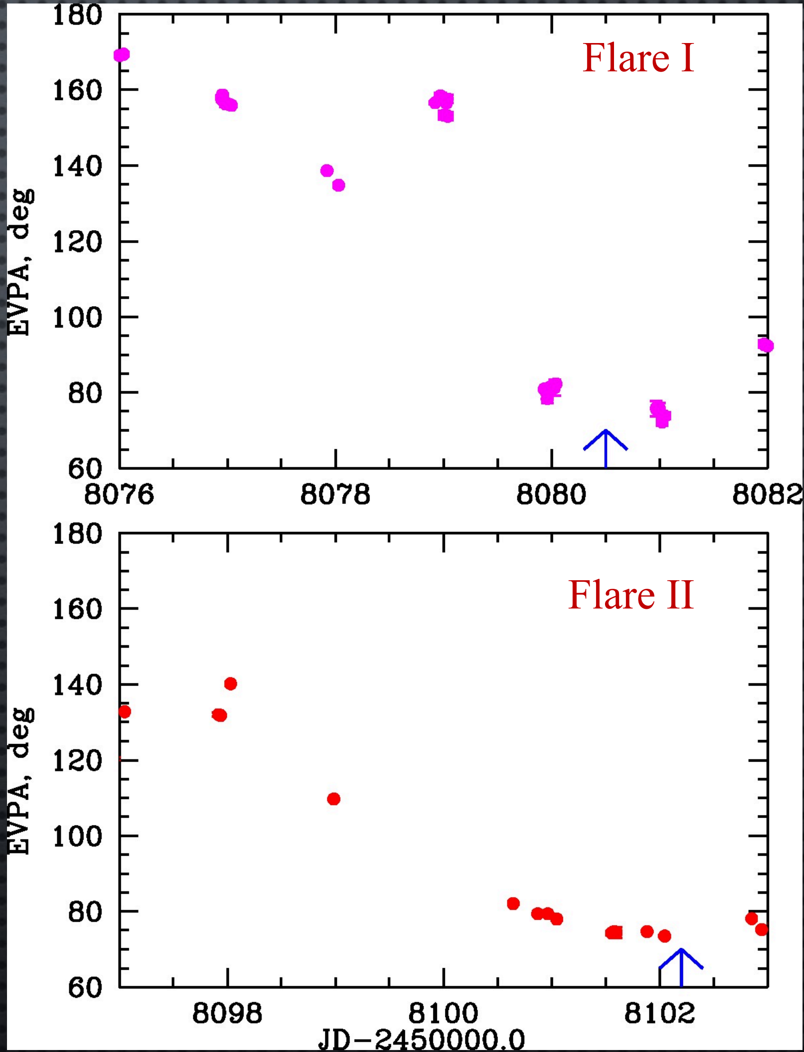
1009 R band Polarization observations with 925 simultaneous photometric measurements from 2005 to 2018



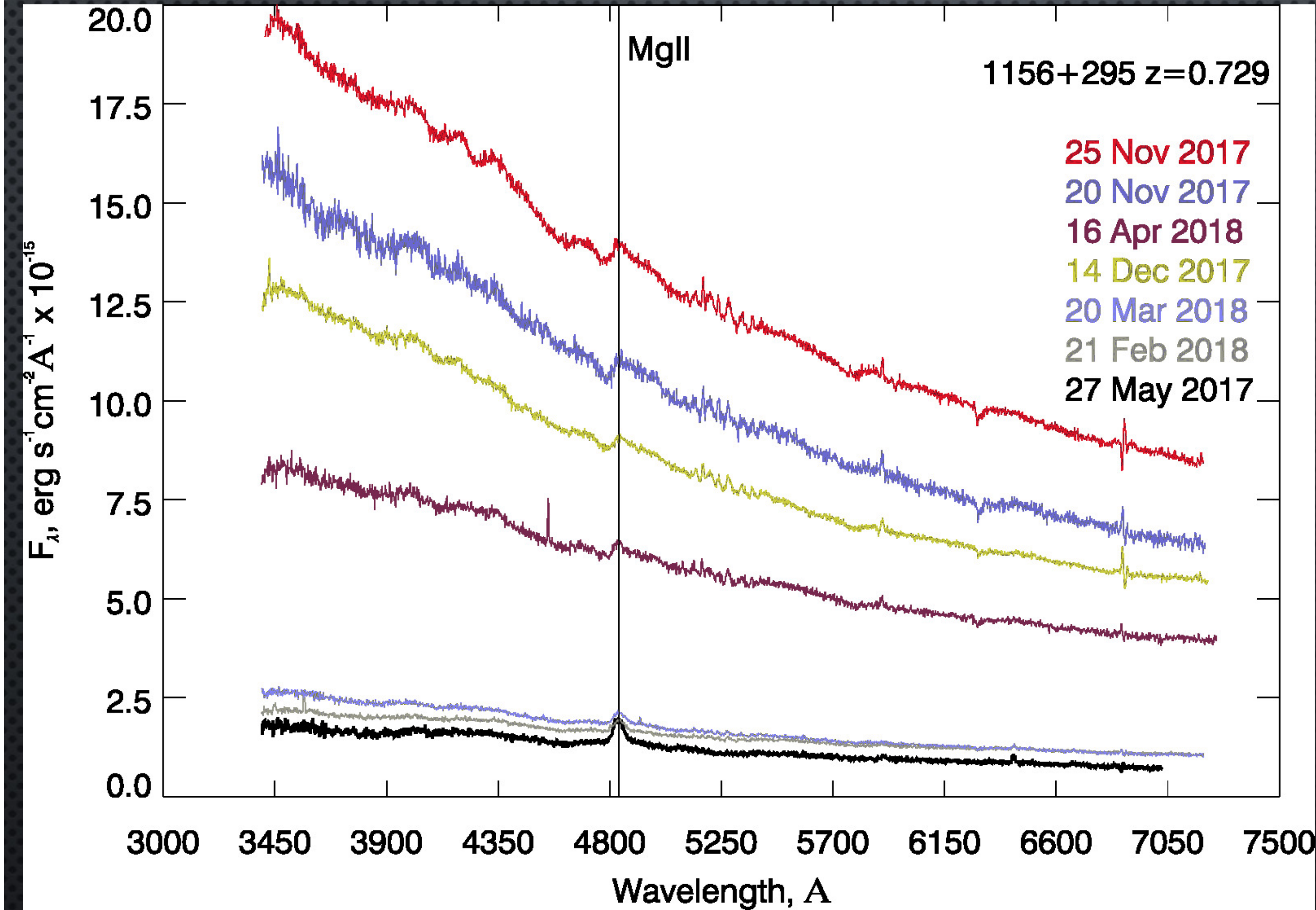


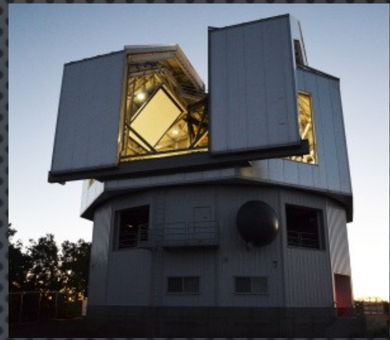
QU STOKES PARAMETER'S PLANE





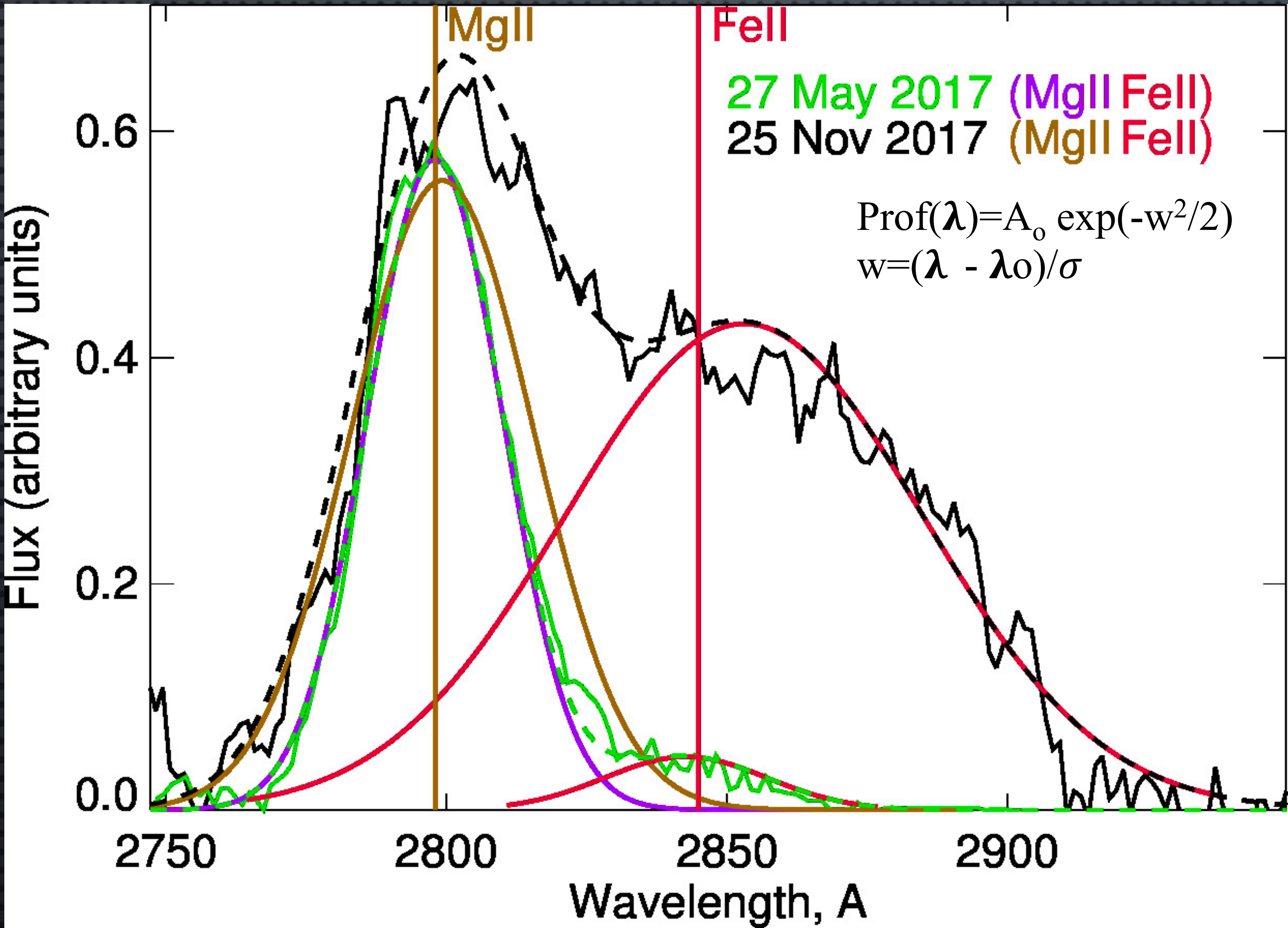
OPTICAL SPECTRA OF 4C+29.45





4.3m DCT
Flagstaff, AZ

LINE PROFILE MODELLING



27 May 2017

MgII :

Ao=0.57±0.04

λo=2798±2

σ = 21±2

v ~2 250 km/s

FeII:

Ao=0.05±0.02

λo=2843±5

σ = 25±2

v ~2 640 km/s

25 Nov 2017

MgII :

Ao=0.56±0.06

λo=2799±7

σ = 28±3

v ~3000 km/s

FeII:

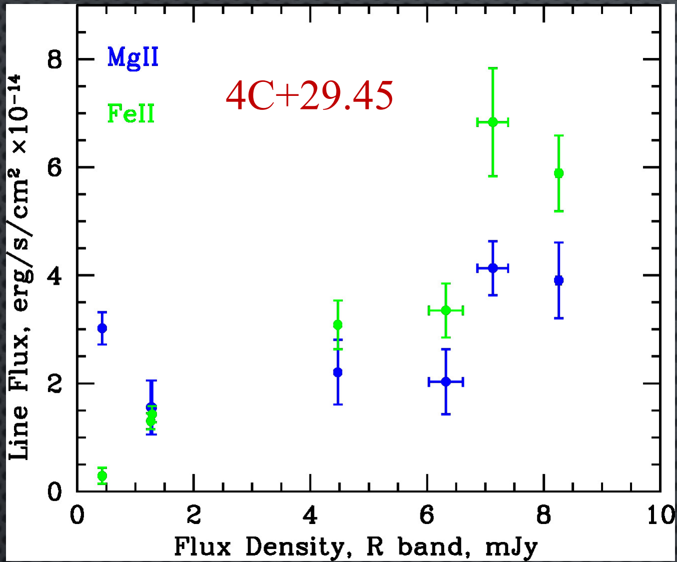
Ao=0.43±0.06

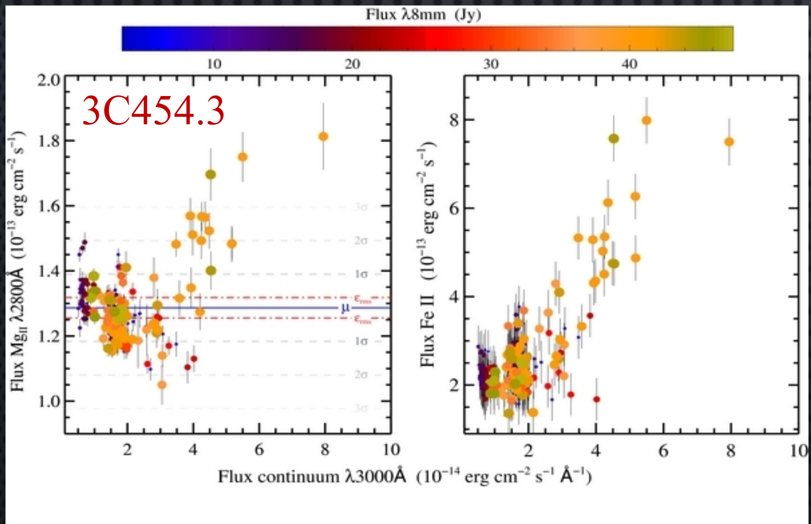
λo=2853±8

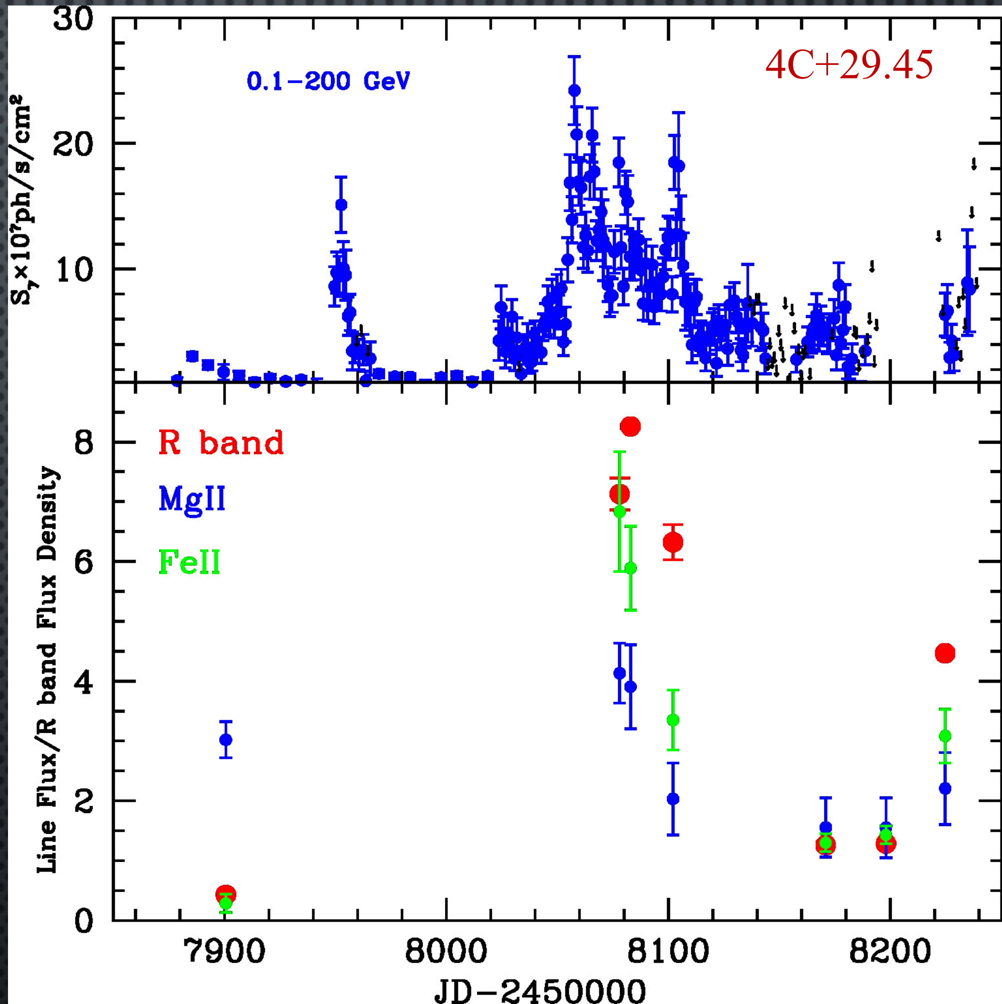
σ = 55±4

v ~5800 km/s

EMISSION LINE VARIABILITY







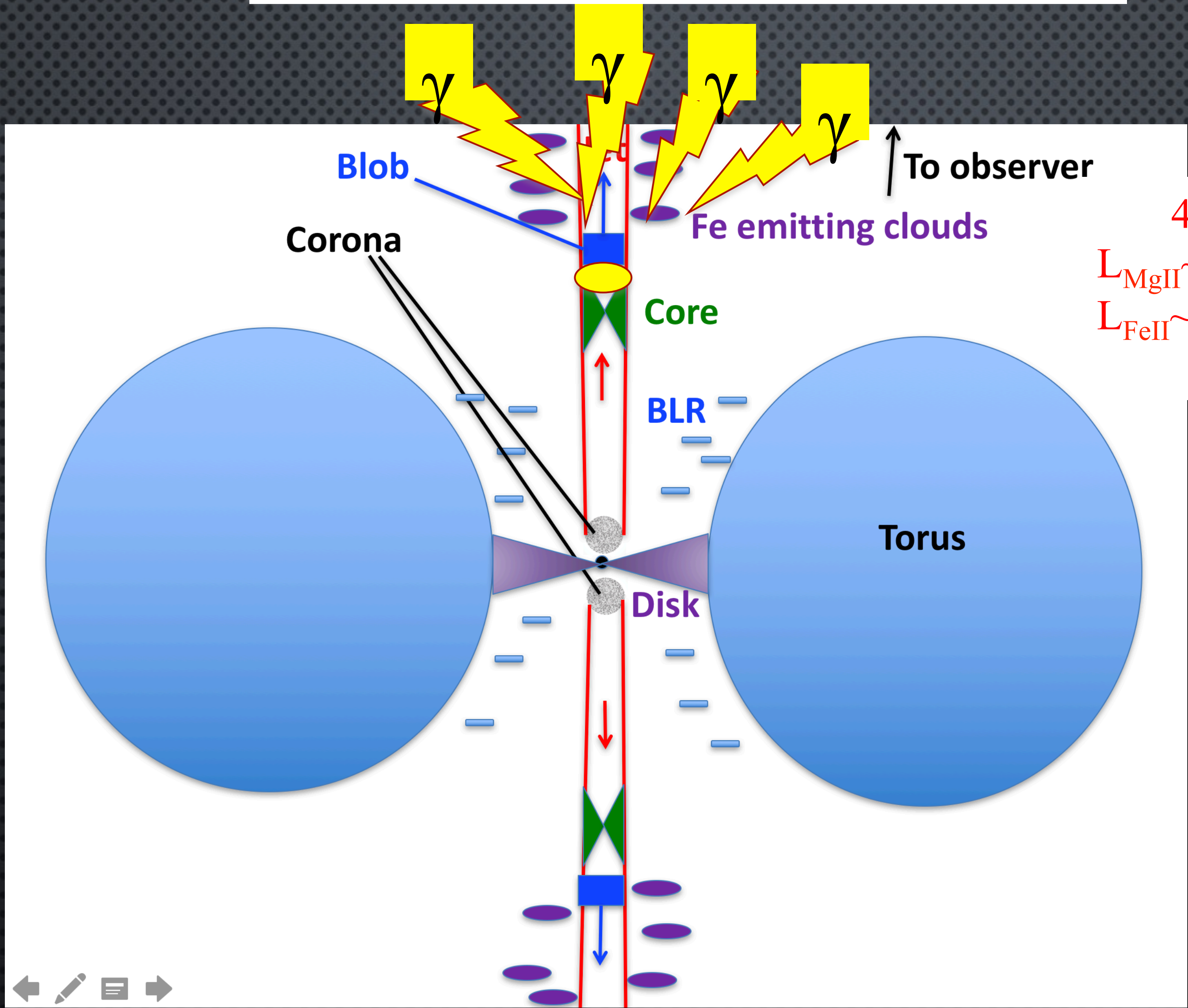
Leon-Tavares et a. 2013

FEII EMISSION LINES IN AGN

Baldwin et al. 2004 " The Origin of FeII Emission in AGN"
use 371 level Fe^{+} model with all energy levels up to 11.6 eV,
which calculates strengths for 68,000 emission lines.

1. A baseline, photoionized model cannot reproduce the strength, shape , and EW width of the Fe II UV bump (the broad features between 2200 and 2800 A).
2. The only parameter that leads to acceptable photoionized models is that of microturbulence with $V_{turb} \gtrsim 100$ km/s, firstly suggested by Netzer & Wills (1983).
3. The observed FeII spectrum can also be reproduced if the FeII emission comes from a separate collisionally ionized component with temperature 5000 K $\lesssim T_e \lesssim$ 20000 K and density ~ 10^{12} - 10^{16} cm^{-3} outside the BLR.

SKETCH OF FSRQ BLAZAR



4C+29.45

L_{MgII}~5.7x10^{43} erg/s

L_{FeII}~9.5x10^{43} erg/s

HAPPY 10-TH BIRTHDAY FERMI GAMMA-RAY TELESCOPE !!!!!!!

EMISSION LINE PROFILES