Science goal (8) : constraints/hints on matter composition of γ-ray emitt.jet region

	leptonic j.e.m.	*hadronic j.e.m.*
matter	$e^+ e^-$	$e^- p$
(a) ν-emission	no	(more or less) yes
(b) γ-ray emission mechanism	IC	(IC &) syn.
[e.g. in HBLs: (most likely)…	SSC	p syn. in ``SPB``,syn. cascades in ``proton blazar``]
(c) B-field	≤ Gauss	> several Gauss [e.g. in ``SPB``: typ. several 10 G, ``neutral beam model``: ~ Gauss, ``proton blazar``: ~ Gauss]
(d) total jet luminosity variability patterns	$L_{jet,lept}$ <	< $L_{jet,hadr}$ *(work in progress)*

Approach:

(b) - polarization measurements @ GeVs

- broad-band modeling using competing models [for HBLs: see goal (2)]

(c) - polarization measurements @ GeVs

- (1) equipartition arguments using low-E peak flux

- (2) width of ACF [assumpt.: rise time E-indep., decay time determ. by radiative cooling]

$\tau_{ACF} = \tau_0 + \tau_1 E_{phot}^{-\alpha}$ [e.g. $E_{phot}=E_{syn}$ & particle spectr. determ.by syn./EIC cooling: $\alpha=1/2$, $\tau_1 \sim B^{-3/2}$

$E_{phot}=E_{syn}$ & particle spectr. determ. by SSC cooling: $\alpha=4-q/2$, $\tau_1 \sim B^{-q/2}$

q=particle injection spectral index

(*) $E_{phot}=E_{IC}$ & particle spectr. determ. by syn. cooling: $\alpha=1/2$, $\tau_1 \sim B^{-2}$ …]

- (3) multi-λ time lags/leads (caused by radiative cooling; assumes co-spatiality for E_{low}, E_{high})

[e.g. $\Delta t_{delay} \sim B^{-3/2} (E_{low}^{-1/2} - E_{high}^{-1/2})$ for low-E comp., syn. cooling,

(*) $\sim B^{-3/2} (E_{low}^{-1/2} - E_{high}^{-1/2})$ for high-E comp., syn. cooling, ….]

(*) requires knowledge of target photon field → modeling

(d) See goal (6)

Required data:

(c2) & (c3): - long consecutive data taking

- short sampling time scales (experience from BL Lac: 1hr sampl. time scale @keVs is too short !)

(b) & (c) :

For unambiguous model fits both simultaneous broad-band SEDs plus variability information (light curves, hysteresis, …) are required in equally distributed energy bands. (see lessons from W Comae !).

Targets: (b)&(c):nearby blazars;(a) strong emission line FSRQs (3C273, 3C279, 3C454.3, PKS 0528+134)

Alternative approach:

Test leptonic models !

Any non-expected behaviour calls for alternative model solutions which may be linked with the need for hadronic jet components (see ``orphan flares``, low-E component lagging high-E component, etc.).

→ See science goals (2)-(4)

Science goal (9) : Which blazar properties are responsible for ``γ-ray loudness`` ?

Approach & required data:

statistical studies, comparison with various blazar samples that select on different criteria; SL motion ?

Targets:

GLAST blazars, γ-ray blazar candidates