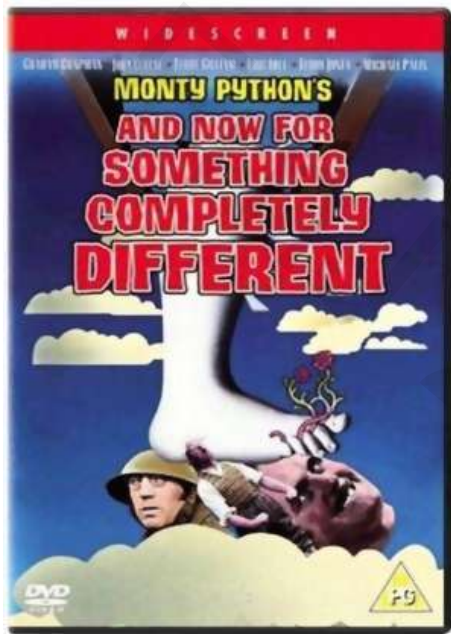


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RadioNet



Radio-submm flares from blazars in a discontinuous jet model

Jörg P. Rachen

Max-Planck-Institute for Astrophysics
Garching, Germany

Fermi meets Jansky

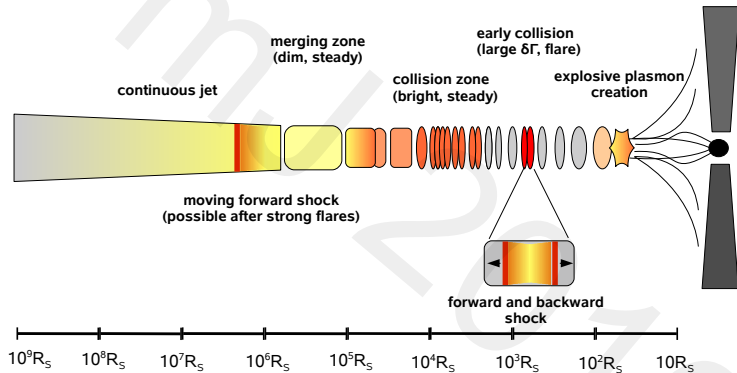
MPIfR Bonn, 2010 June 21-23



- 1 discontinuous jets
- 2 flares in a discontinuous jet
- 3 fits to the 2005/06 flares from 3C454.3
- 4 implications for gamma-ray production



the discontinuous jet model



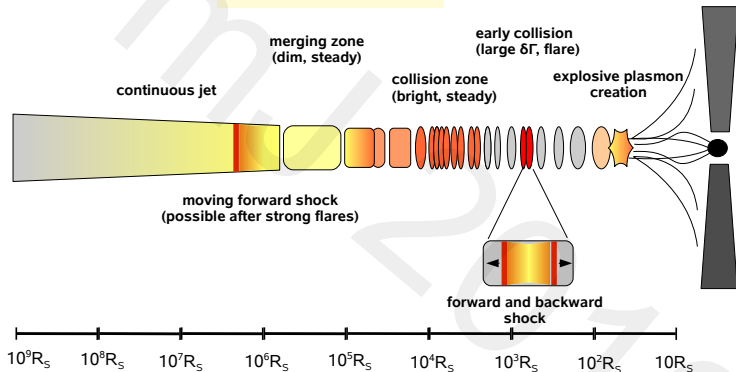
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the discontinuous jet model

$$r_{\text{col}} \sim \frac{\Gamma_{\text{jet}}^2 c}{f_* (\delta\Gamma/\Gamma)}$$



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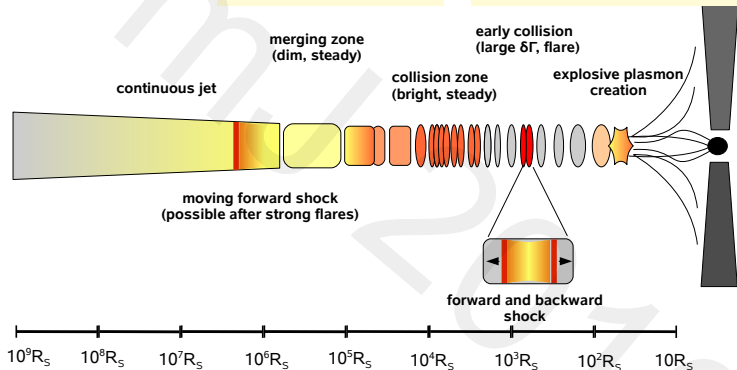


RadioNet

the discontinuous jet model

$$r_{\text{col}} \sim \frac{\Gamma_{\text{jet}}^2 c}{f_* (\delta\Gamma/\Gamma)}$$

$$L_{\text{syn}} \propto (\delta\Gamma/\Gamma)^{5...8}$$



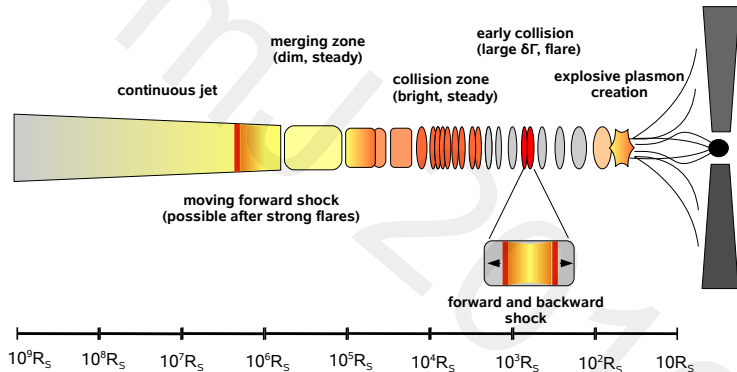
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RadioNet

the discontinuous jet model

Spada, M., et al., 2001, MNRAS 325, 1559

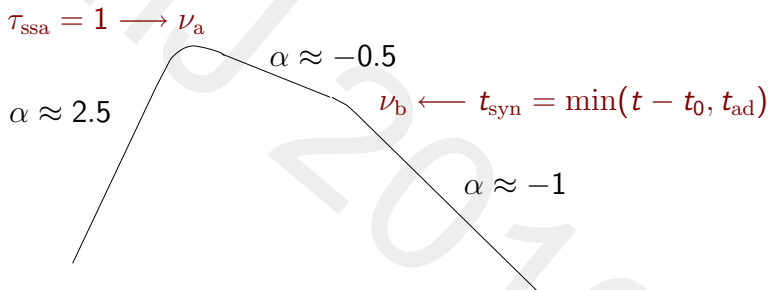
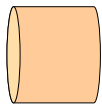


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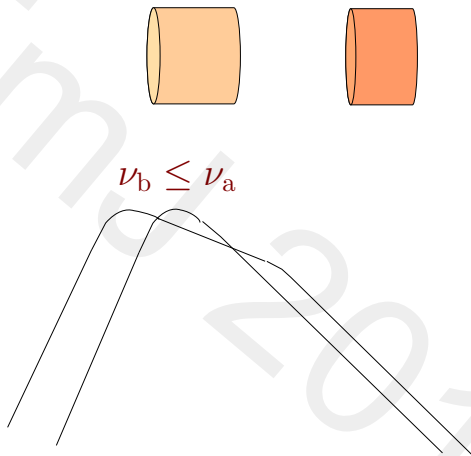
“quiescent” emission



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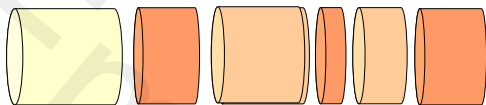
“quiescent” emission



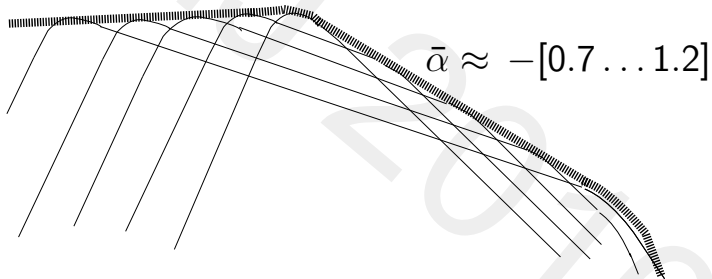
MAX-PLANCK-GESSELLSCHAFT



“quiescent” emission



$$\bar{\alpha} \approx 0$$



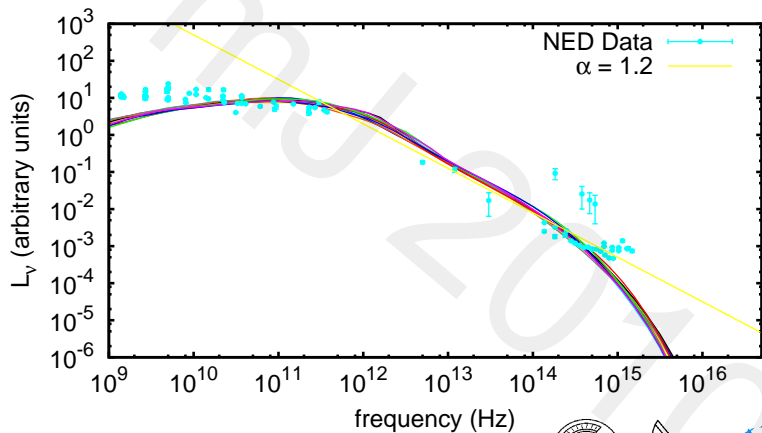
$$\bar{\alpha} \approx -[0.7 \dots 1.2]$$



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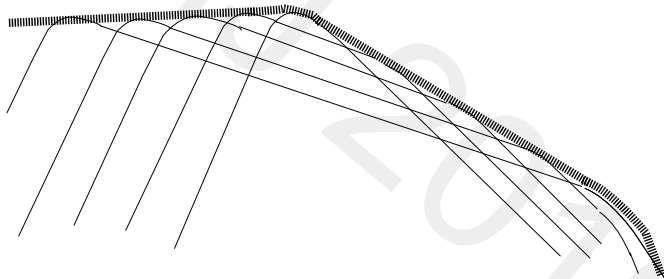
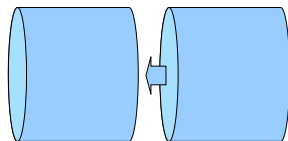
discontinuous jet fit to 3C454.3



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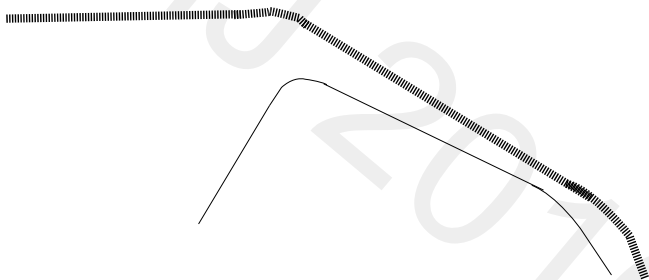
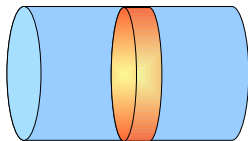
flares in a discontinuous jet



MAX-PLANCK-GESSELLSCHAFT



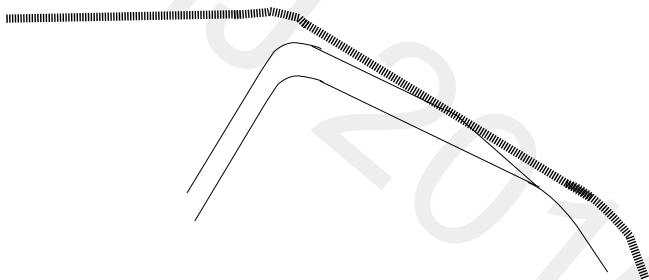
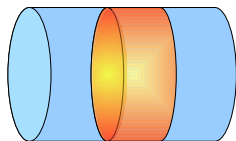
flares in a discontinuous jet



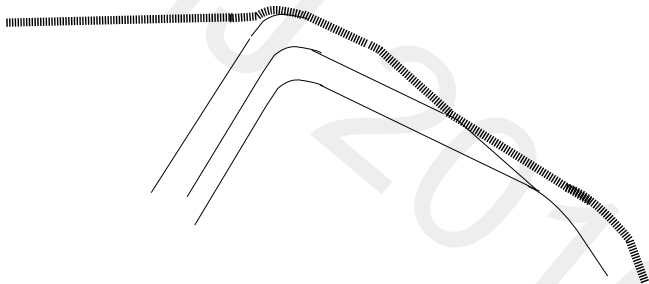
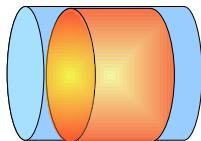
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flares in a discontinuous jet



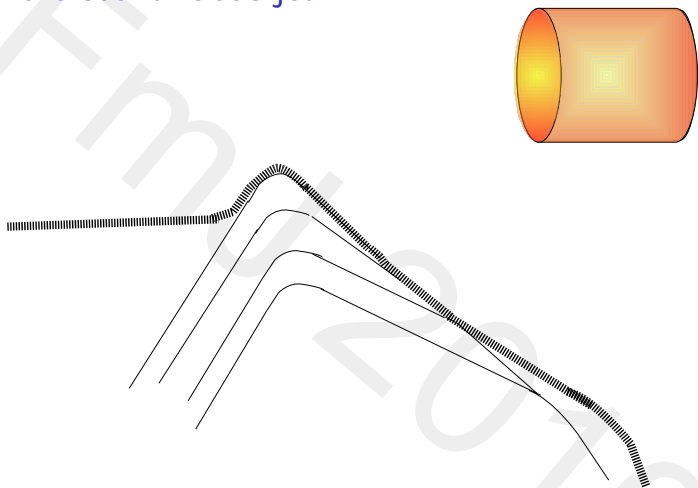
flares in a discontinuous jet



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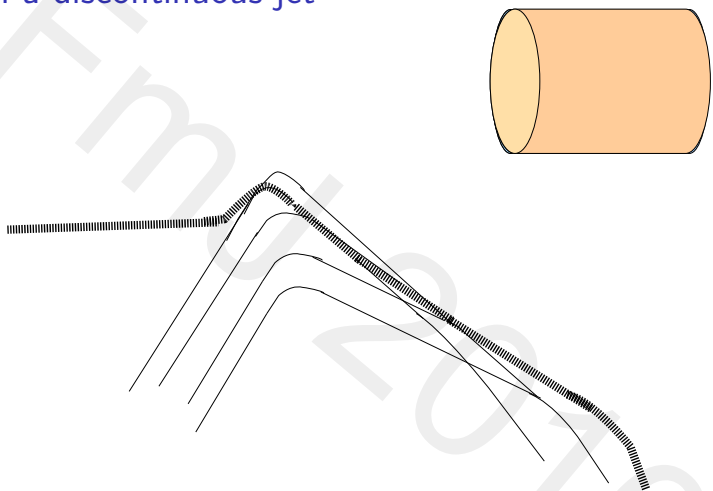
flares in a discontinuous jet



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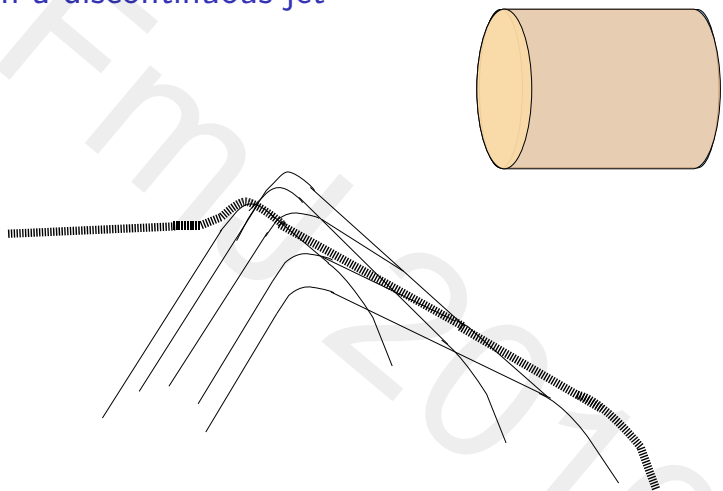
flares in a discontinuous jet



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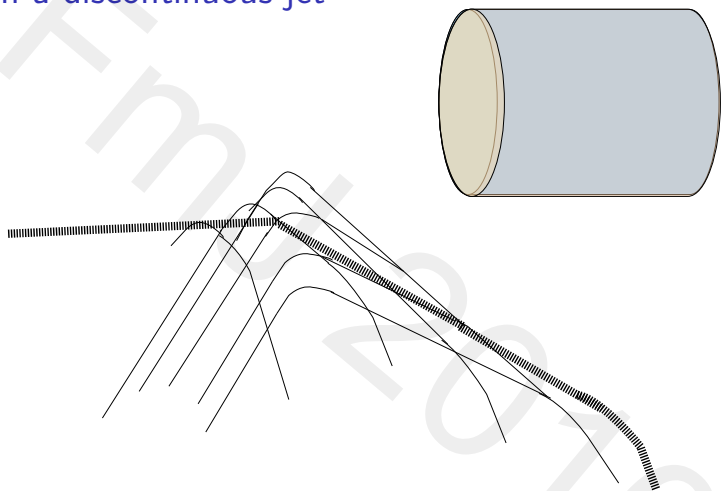
flares in a discontinuous jet



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flares in a discontinuous jet

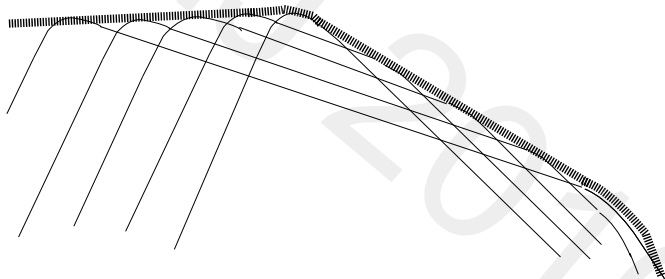
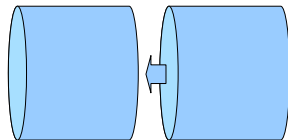


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RadioNet

flares in a discontinuous jet

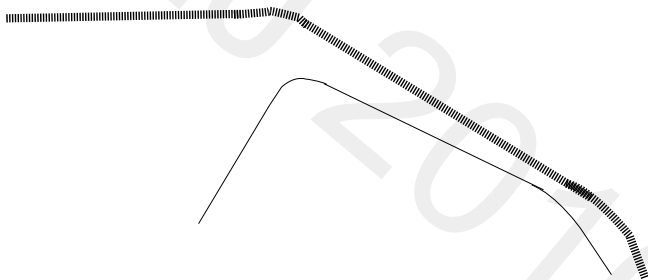
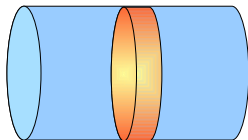


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RadioNet

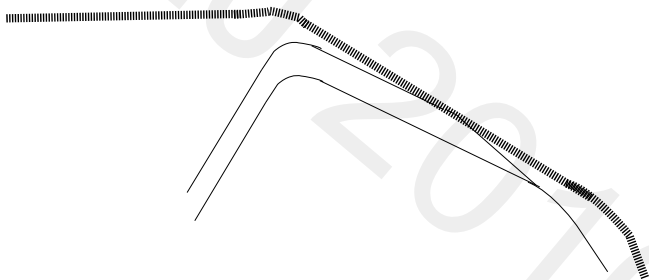
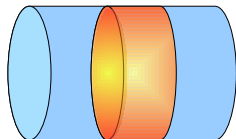
flares in a discontinuous jet



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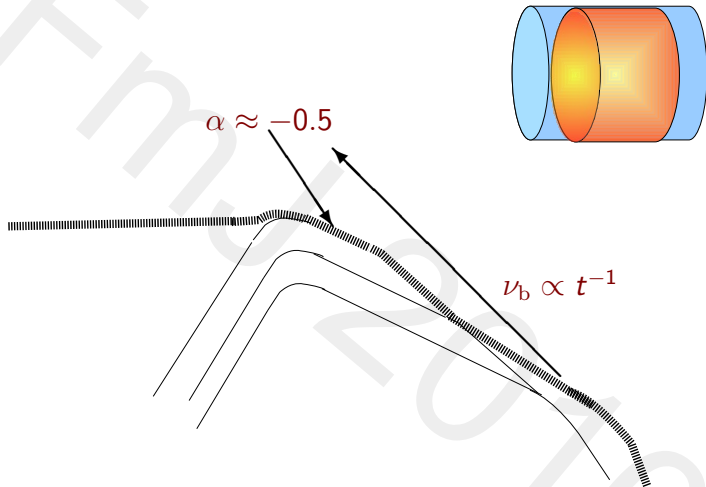
flares in a discontinuous jet



MAX-PLANCK-GESSELLSCHAFT



flares in a discontinuous jet

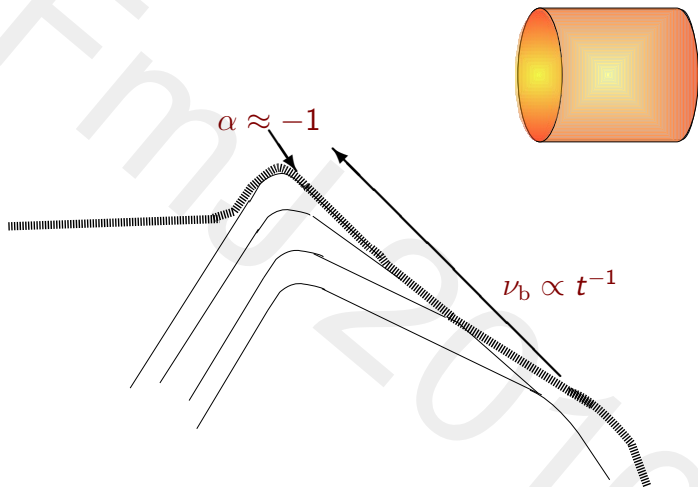


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RadioNet

flares in a discontinuous jet

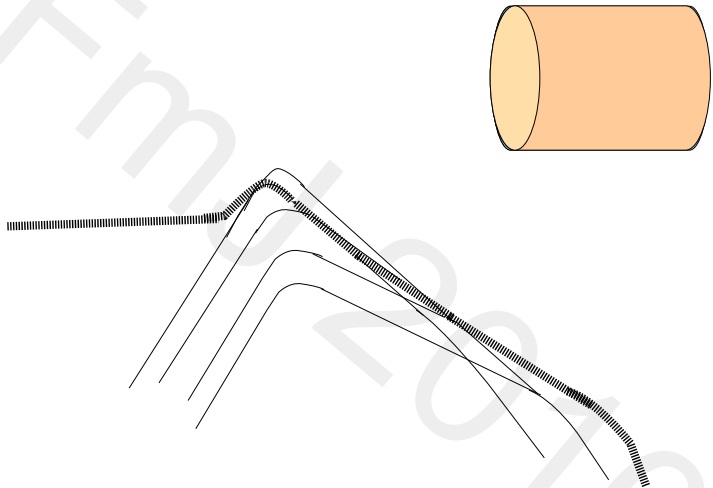


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RadioNet

flares in a discontinuous jet

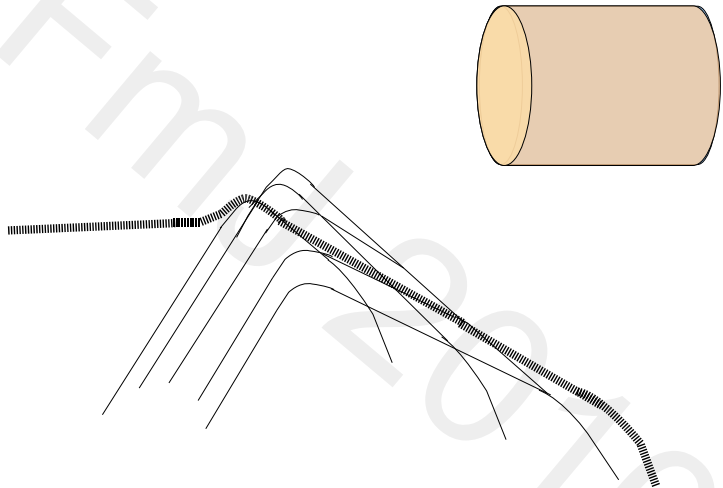


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RadioNet

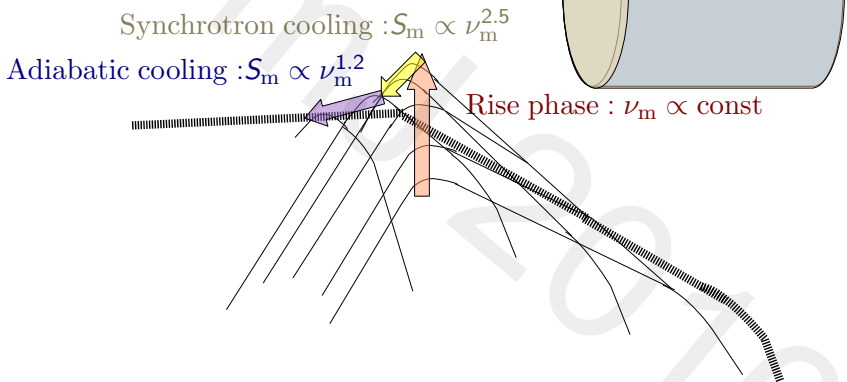
flares in a discontinuous jet



MAX-PLANCK-GESSELLSCHAFT



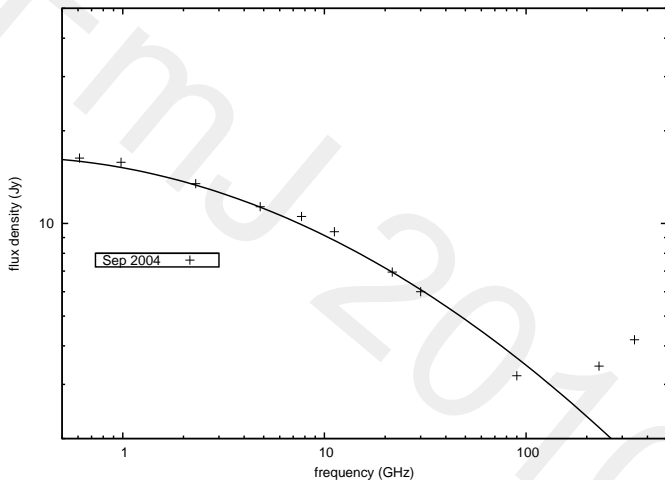
flares in a discontinuous jet



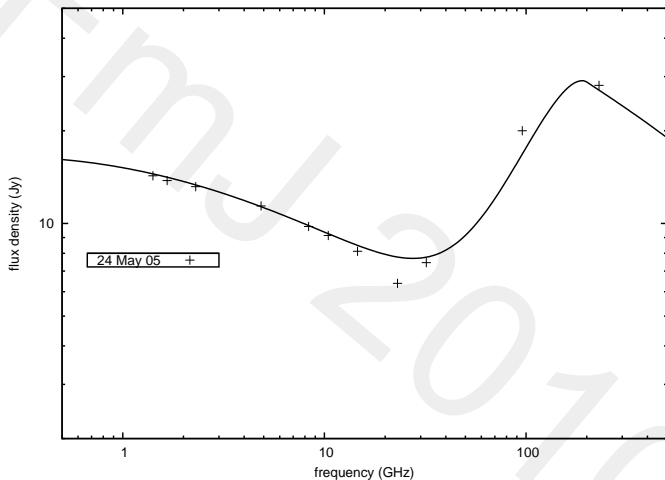
MAX-PLANCK-GESellschaft



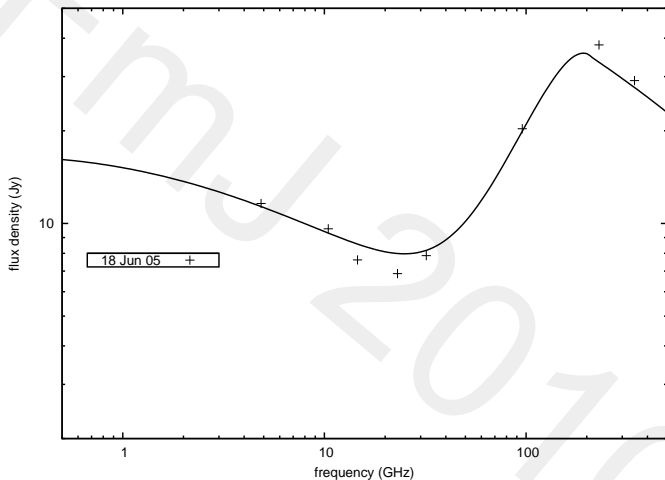
the 2005/06 flare from 3C454.3 (Effelsberg, IRAM, SMA)



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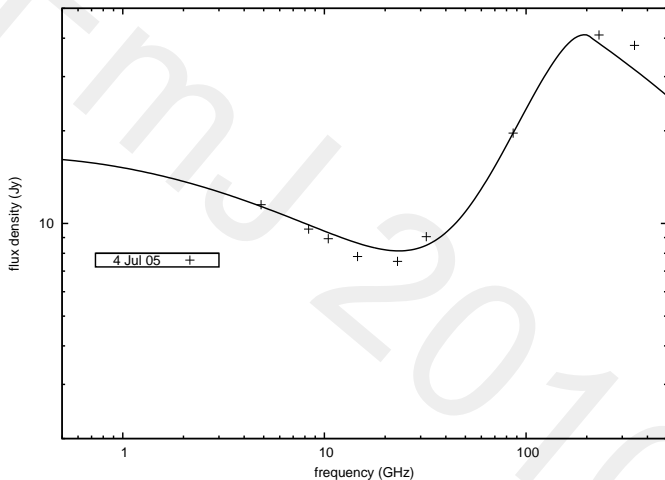
the 2005/06 flare from 3C454.3 (Effelsberg, IRAM, SMA)



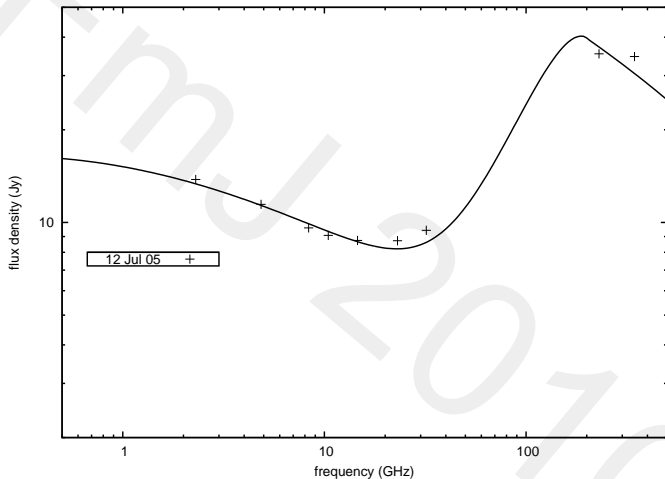
MAX-PLANCK-GESellschaft



the 2005/06 flare from 3C454.3 (Effelsberg, IRAM, SMA)



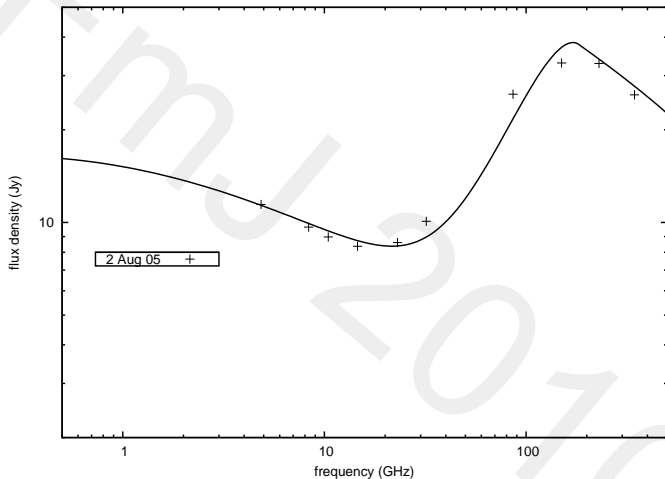
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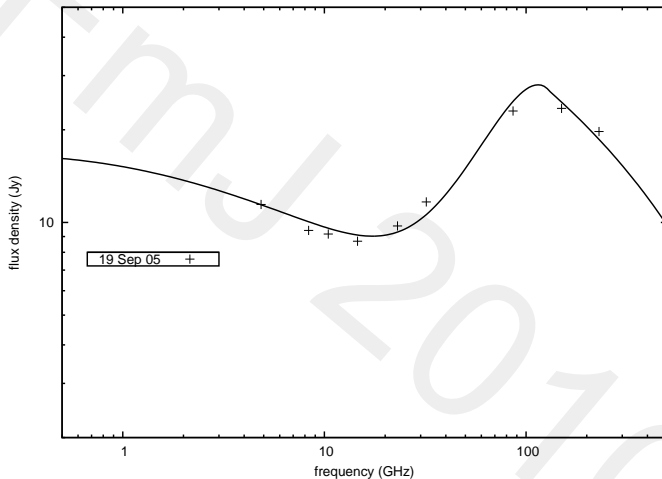
MAX-PLANCK-GESellschaft



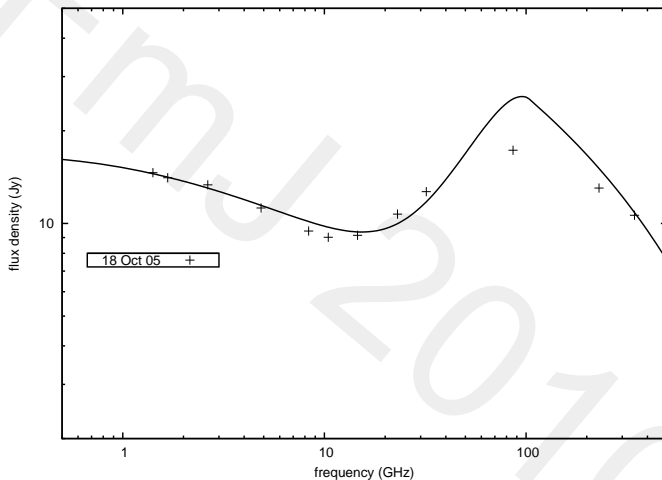
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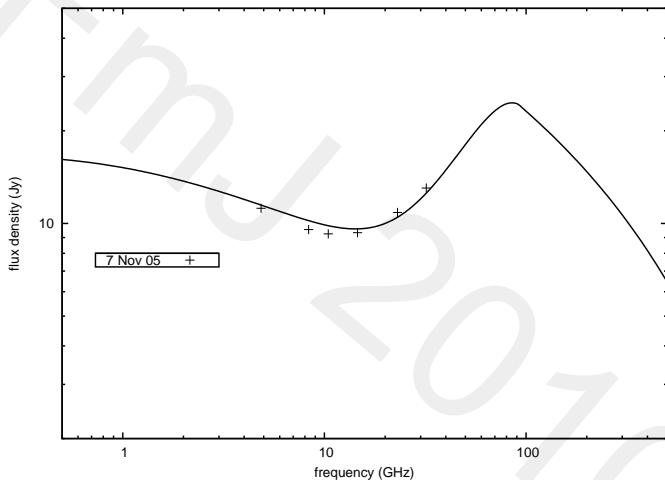
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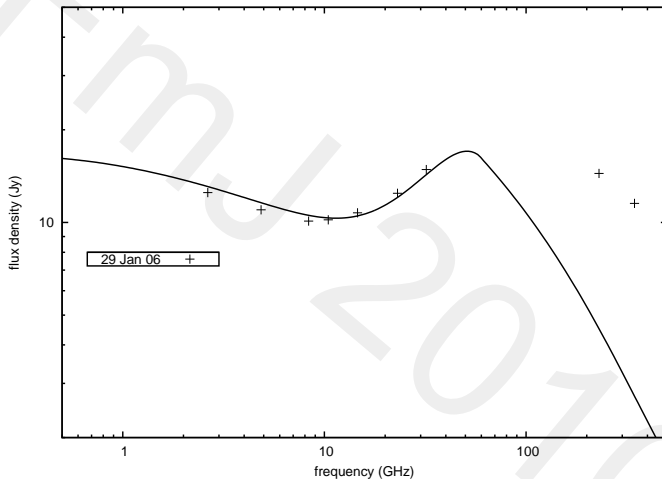
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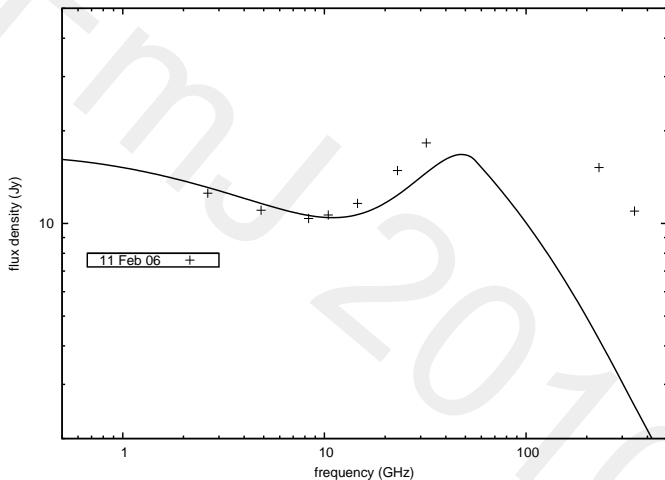
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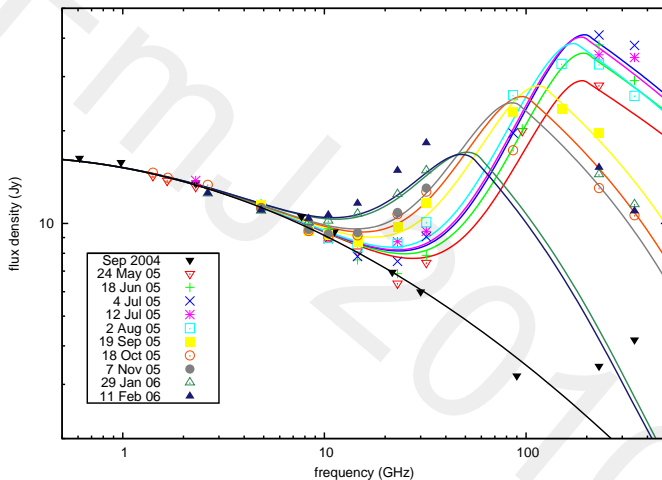
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the 2005/06 flare from 3C454.3 (Effelsberg, IRAM, SMA)



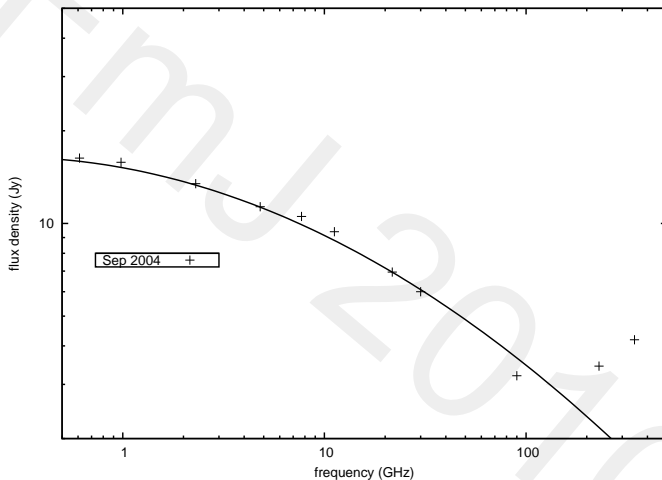
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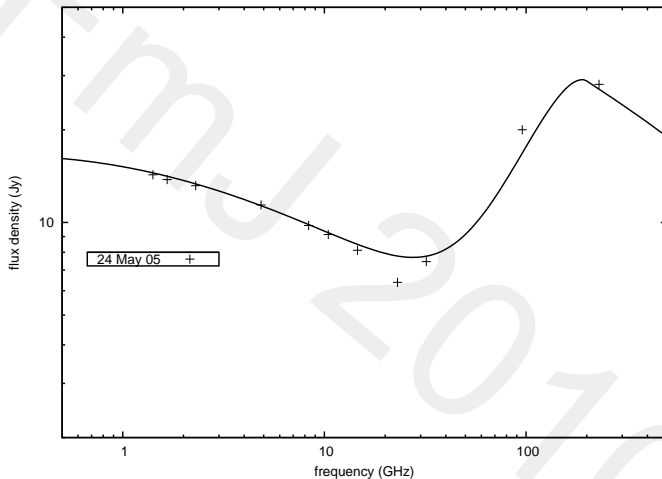
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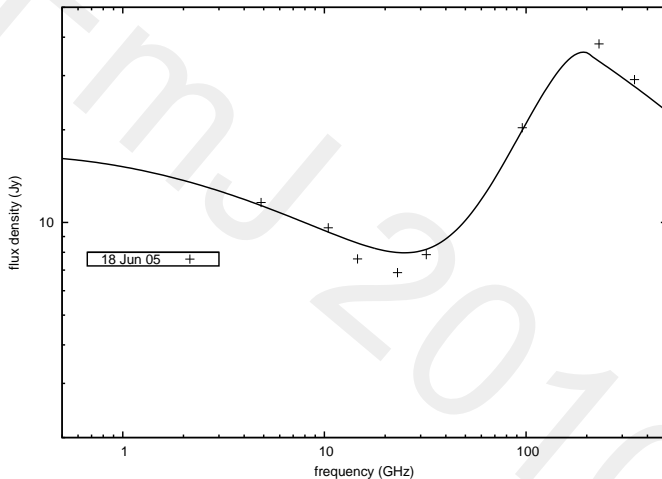
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the 2005/06 flare from 3C454.3 (Effelsberg, IRAM, SMA)



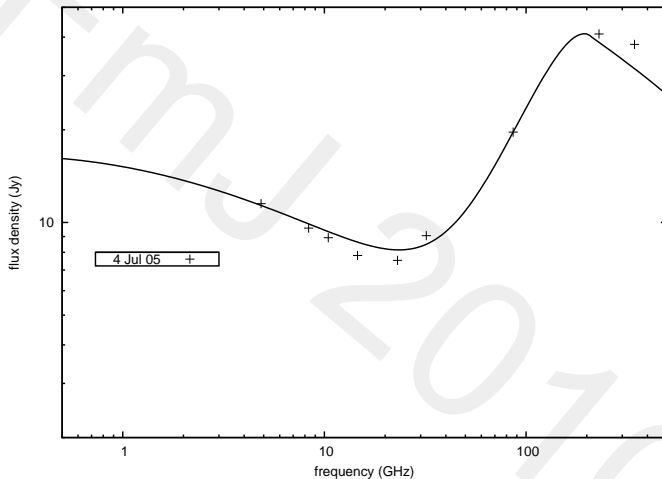
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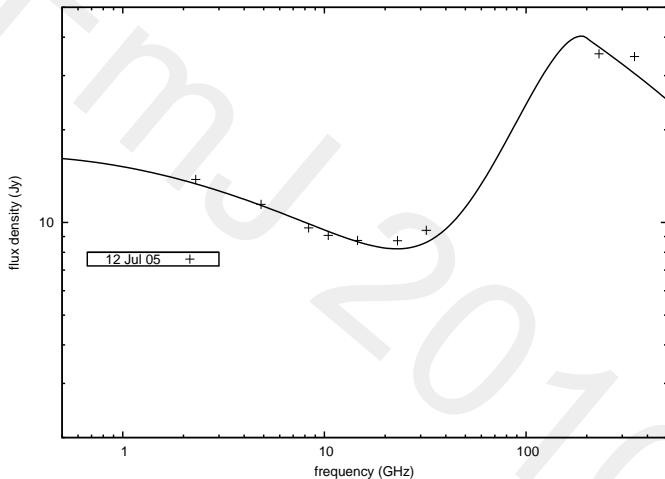
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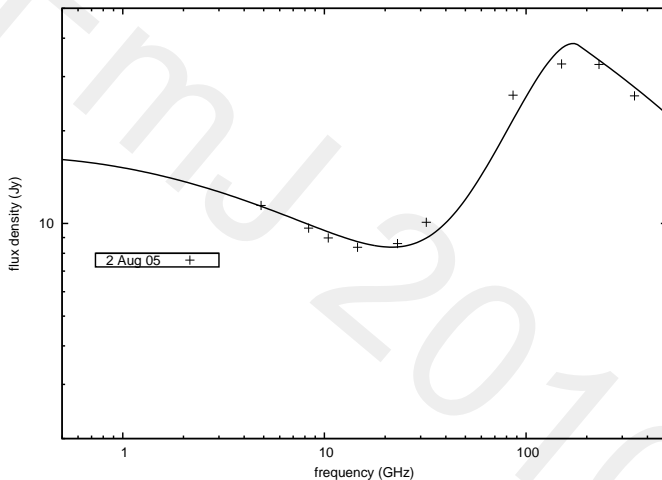
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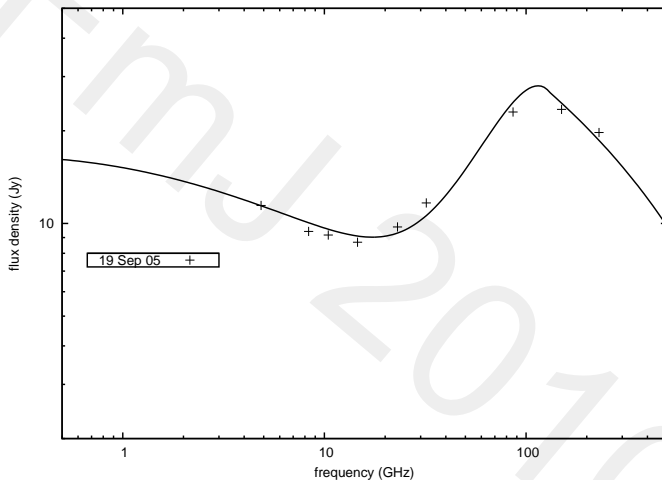
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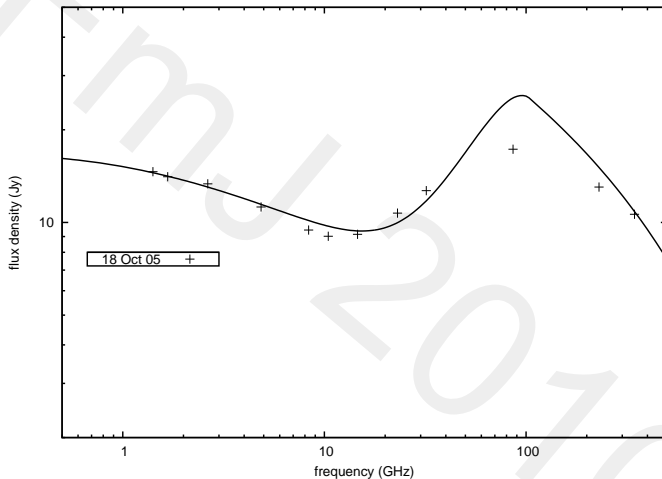
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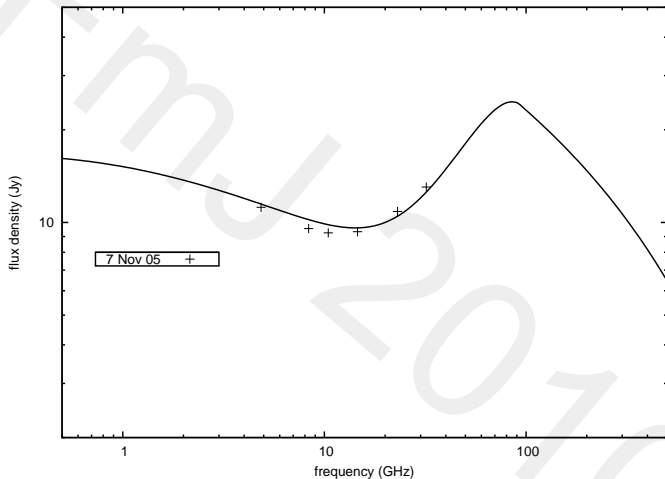
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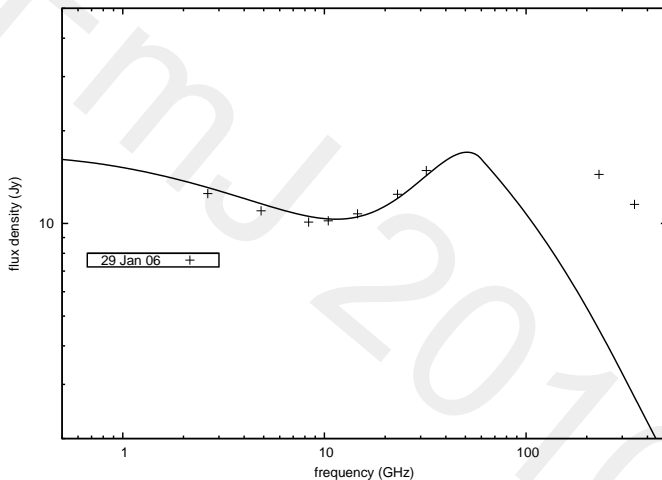
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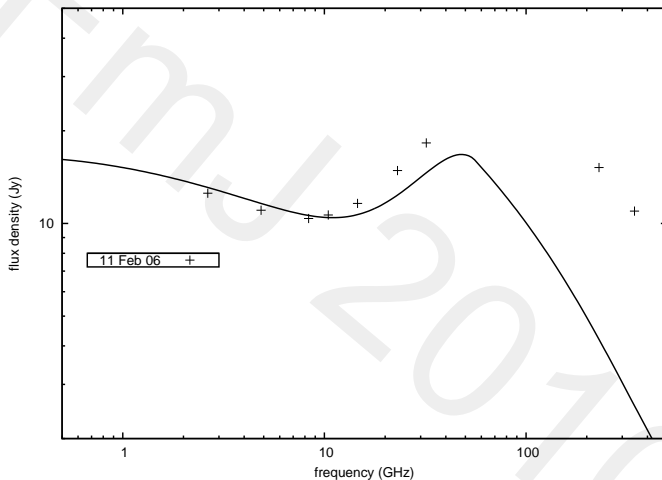
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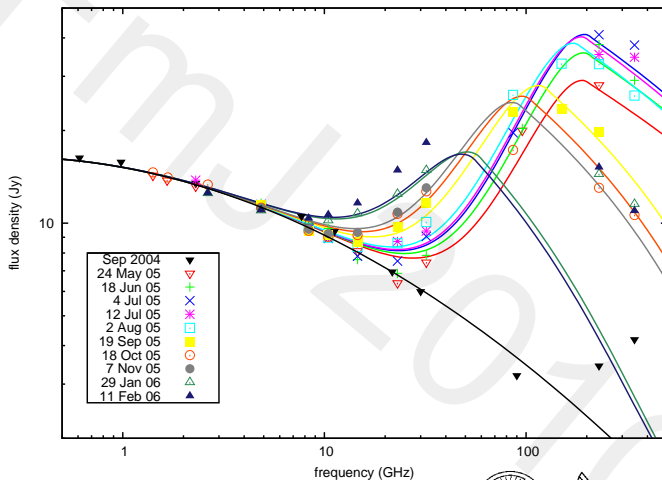
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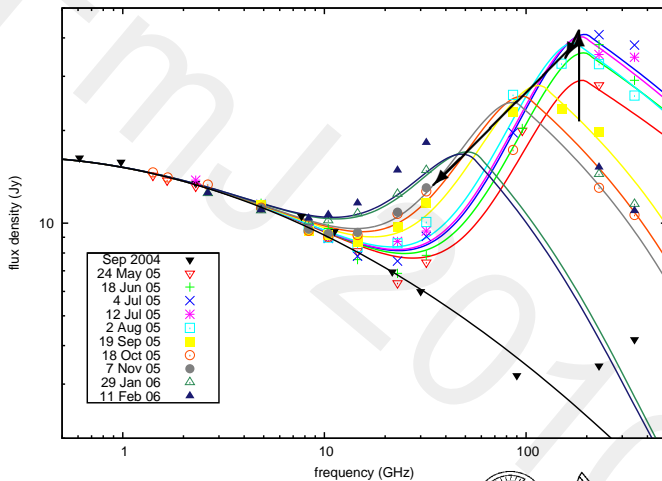
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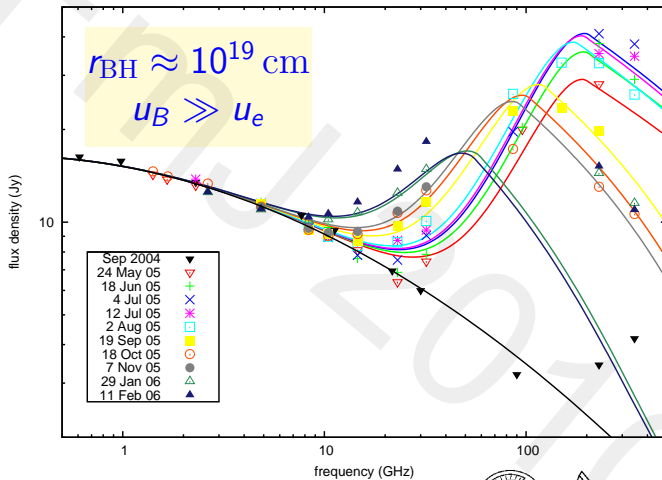
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gamma ray production mechanisms?

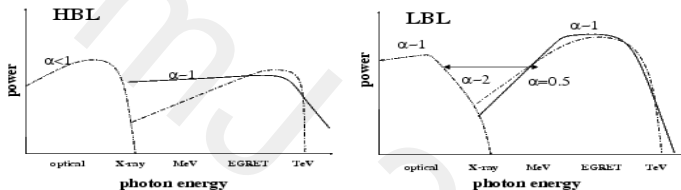


FIGURE 1. Generic SS-PIC spectra for HBL (left) and LBL (right) type blazars. Dashed high-energy lines show a typical spectral shape of an SSC model for comparison.

gamma ray production mechanisms?

Hadronic blazar models and correlated X-ray/TeV flares

Jörg P. Rachen

CP515, G41-T4 Gamma Ray Astrophysics Workshop, edited by B. L. Dingus, et al.
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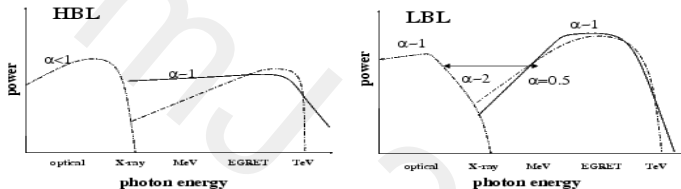


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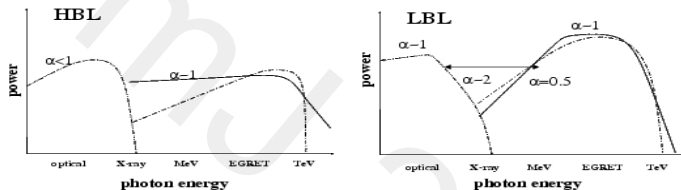


FIGURE 1. Generic SS-PIC spectra for HBL (left) and LBL (right) type blazars. Dashed high-energy lines show a typical spectral shape of an SSC model for comparison.

ponents. Such composition of multiple relativistic plasmoids predicts that the large γ -ray excess, over a simple SSC model, observed in many LSP blazars in Figure 36, and the flat or concave shape of the γ -ray SED of a number of ISP/HSP blazars (see e.g., 3C66A, Figure 3, PKS 0447-439, Figure 6, 1ES 0502+675, Figure 7, and PG 1246+586, Figure 15) is the result of the presence of a second (or higher order) SSC component that is subdominant in the low- ν (radio-IR) range but emerges at higher energies, after the synchrotron peak of the first, less energetic, component (see, e.g., the case of S5 0716+714; Giommi et al. 2008). The combination of these multiple components is



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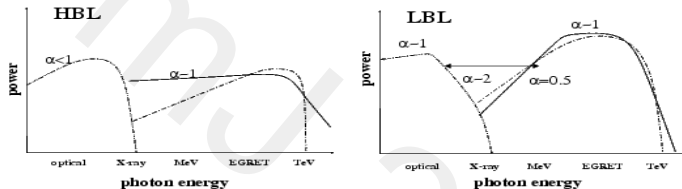


FIGURE 1. Generic SS-PIC spectra for HBL (left) and LBL (right) type blazars. Dashed high-energy lines show a typical spectral shape of an SSC model for comparison.

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