Dijet Mass Fraction for DPE Events

Fraction of dijet mass to the central system mass:

$$\boxed{R_{jj} \equiv \frac{M_{jj}}{M_{DPE}} = \sqrt{\beta_1 \, \beta_2}}$$

- M_{jj} : dijet mass
- M_{DPE} : central DPE system mass
- β : fractional momentum of the pomeron ($I\!\!P$) carried by the interacting parton

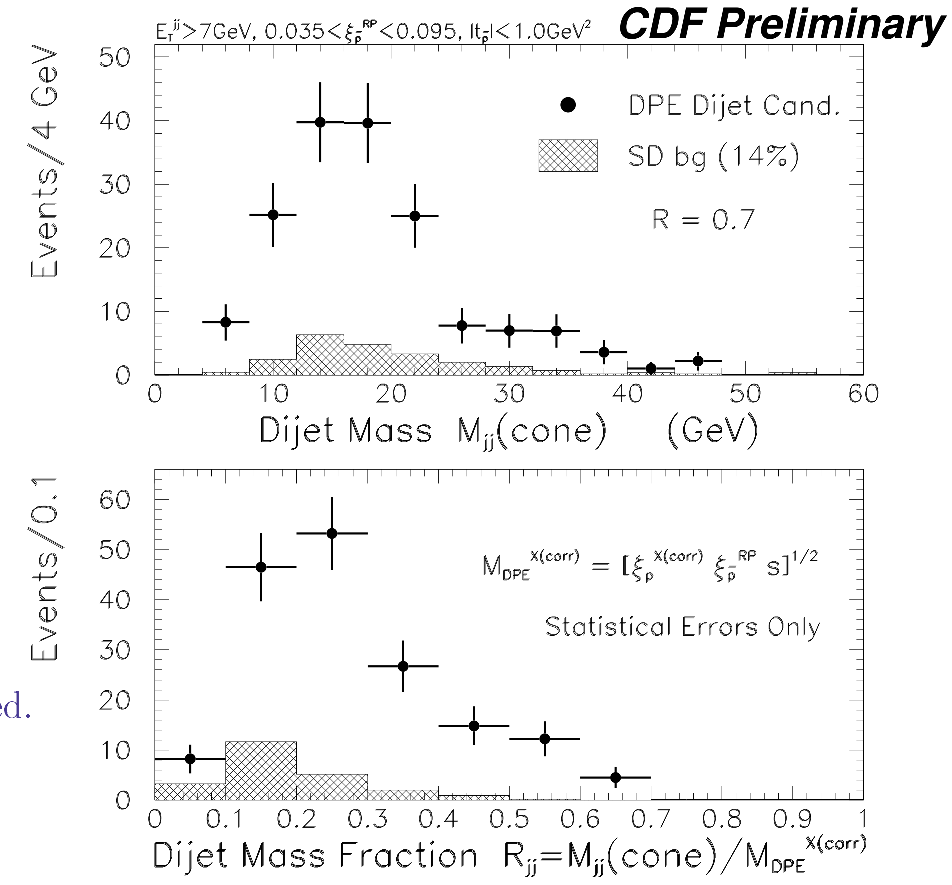
Dijet mass M_{jj}(cone)

- CDF standard jet corrections used.
- No out-of-cone correction.

DPE system mass M^X_{DPE}

$$M^X_{DPE} = \sqrt{\xi^X_p \cdot \xi^{RP}_{\bar{p}} \cdot s}$$

Blessed Plot



Limit on Non-Factorizable DPE Contribution

"Non-Factorizable DPE events:"

$$\boxed{p + \bar{p} \rightarrow p + \bar{p} + jet + jet}$$

$\Rightarrow$ Only two jets in final state!!

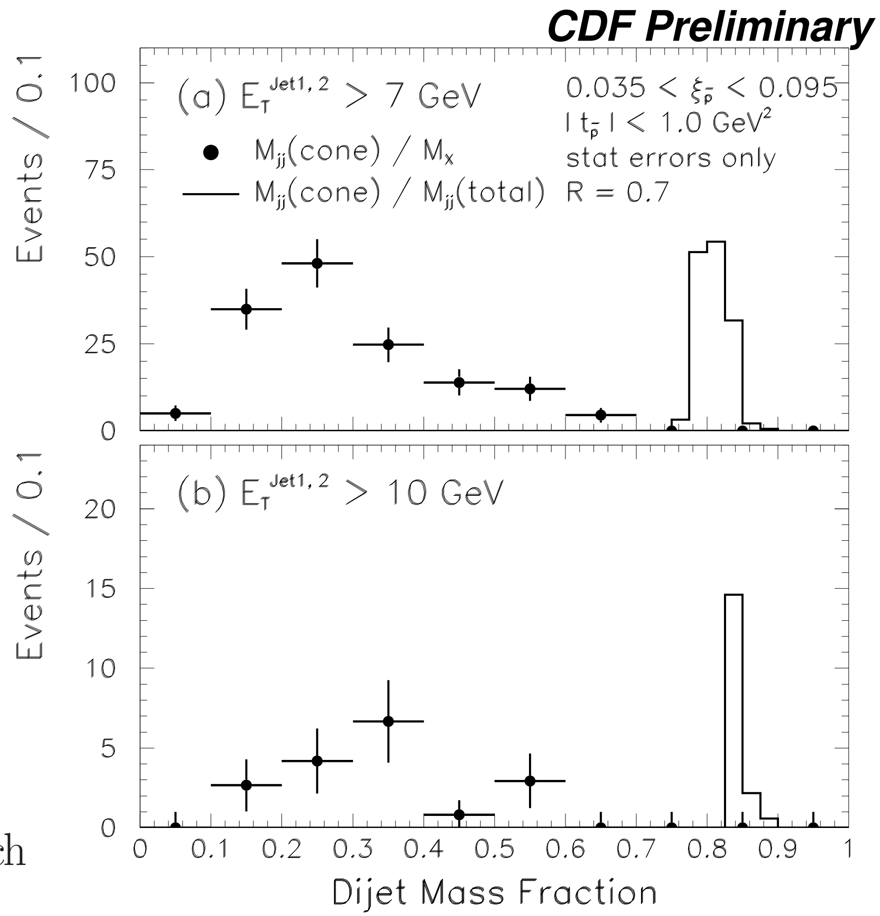
$$R_{jj} = \frac{M_{jj}(\text{cone})}{M^X_{DPE}} = \frac{M_{jj}(\text{cone})}{M_{jj}(\text{total})}$$

- $M_{jj}(\text{total})$: dijet mass of jets fully corrected including the out-of-cone.

$\rightarrow$ 0 events observed for $R_{jj} > 0.7$ at $E_T^{jet} > 7\,\text{GeV}$.

Considering systematic effects which can cause shifts in R_{jj} values,

Blessed Plot



$\Rightarrow$ **1 event observed for $R_{jj} > 0.7$.**

Upper bound of NF-DPE candidates = **5.1 events at 95 % C.L.**

Limit on Non-Factorizable DPE Contribution

◯ DPE Dijet Cross Section :

$$\sigma^{jj}_{DPE} \;=\; 59.7\,\mathrm{nb} \qquad @\; E_T^{jet1,2} > 7\,\mathrm{GeV},\; -4.2 < \eta^{jet1,2} < 2.4,$$
$$0.035 < \xi_{\bar{p}} < 0.095,\; |t_{\bar{p}}| < 1.0\,\mathrm{GeV}^2$$

- stat. error = $\pm 10\,\%$
- syst. error = $\pm 23\,\%$ (except for jet energy scale and UE energy errors)

$\hookrightarrow$ total error = $\pm 25\,\%$

◯ DPE Dijet Cross Section per Event:

$$\hat{\sigma}^{jj}_{DPE} \;=\; \frac{59.7}{117.7} \times (1 \pm 0.25) \;=\; 0.51 \pm 0.13\,\mathrm{nb}$$

- 117.7 = Number of DPE events observed in above kinematical range.

$\Rightarrow$ NF-DPE Upper Limit as Dijet Cross Section at 95 % C.L.:

$$\sigma^{jj}_{NF-DPE} \;=\; 5.1\mathrm{events} \times (0.51 + 1.64 \times 0.13) \;=\; 3.7\,\mathrm{nb}$$

($\hookrightarrow$ Blessing Result)

A. Berera's NF-DPE model (hep-ph/9910405) : $\sigma^{jj}_{NF-DPE} \;=\; 1.7 \sim 5.6\,\mu\mathrm{b}$

$\Rightarrow$ The data NF-DPE production rate is a factor of 10^3 smaller than the theoretical calculation by A. Berera.