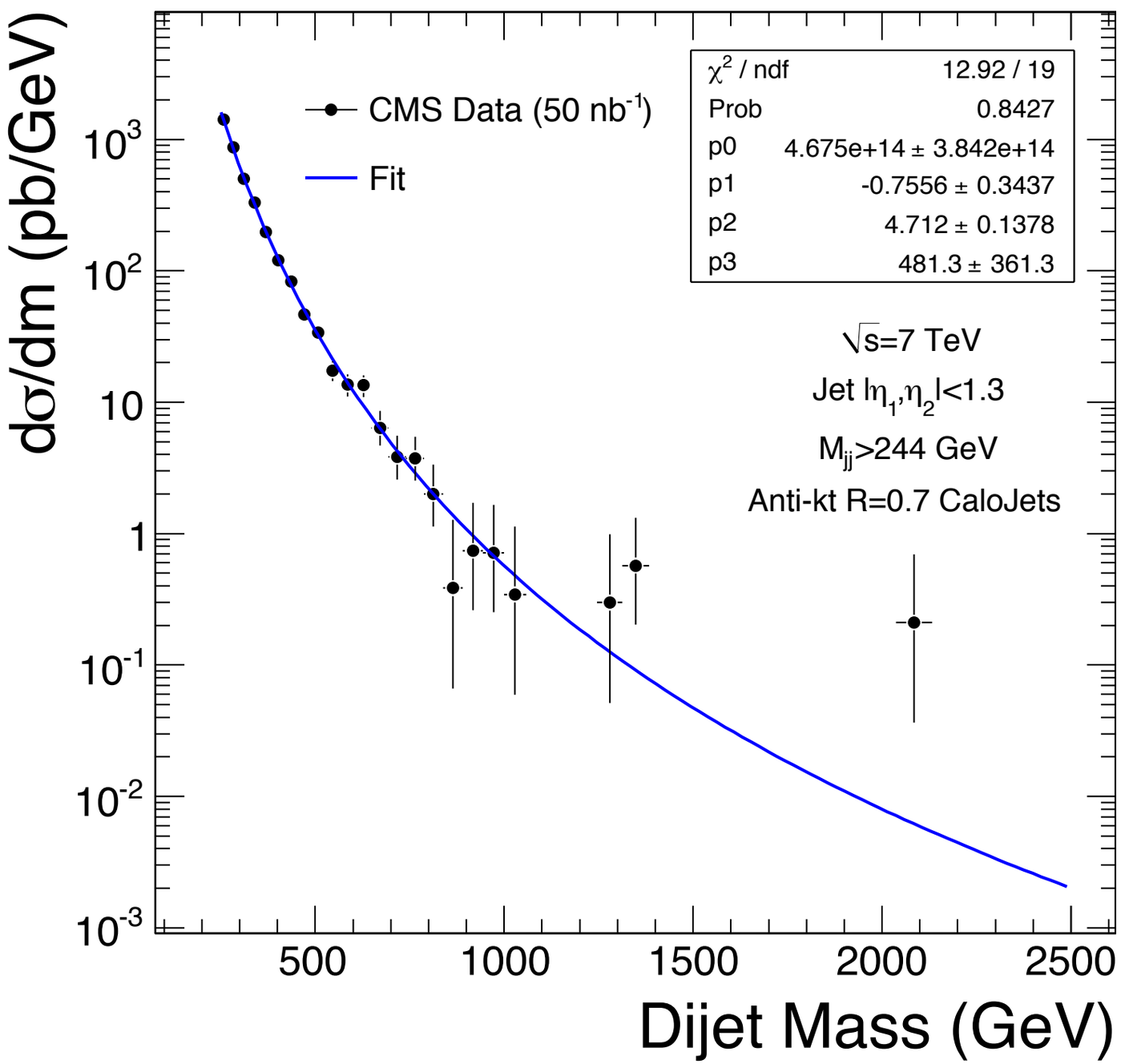
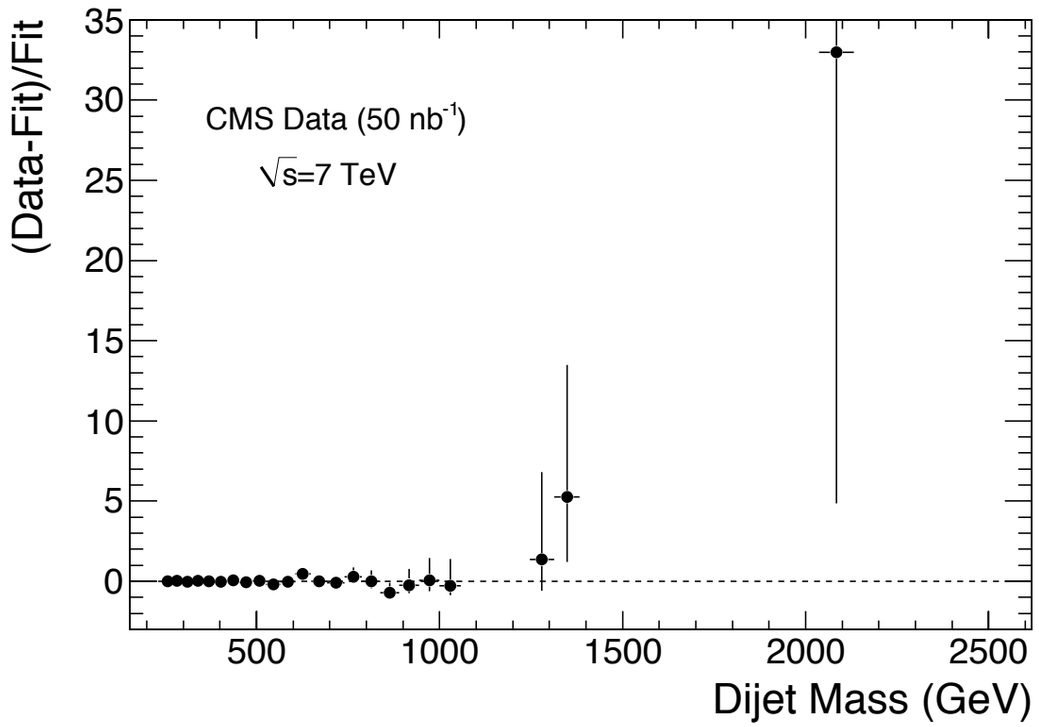
Dijet Mass and Fit

- We fit the data with the function with 4 parameters.
- We get a good fit.

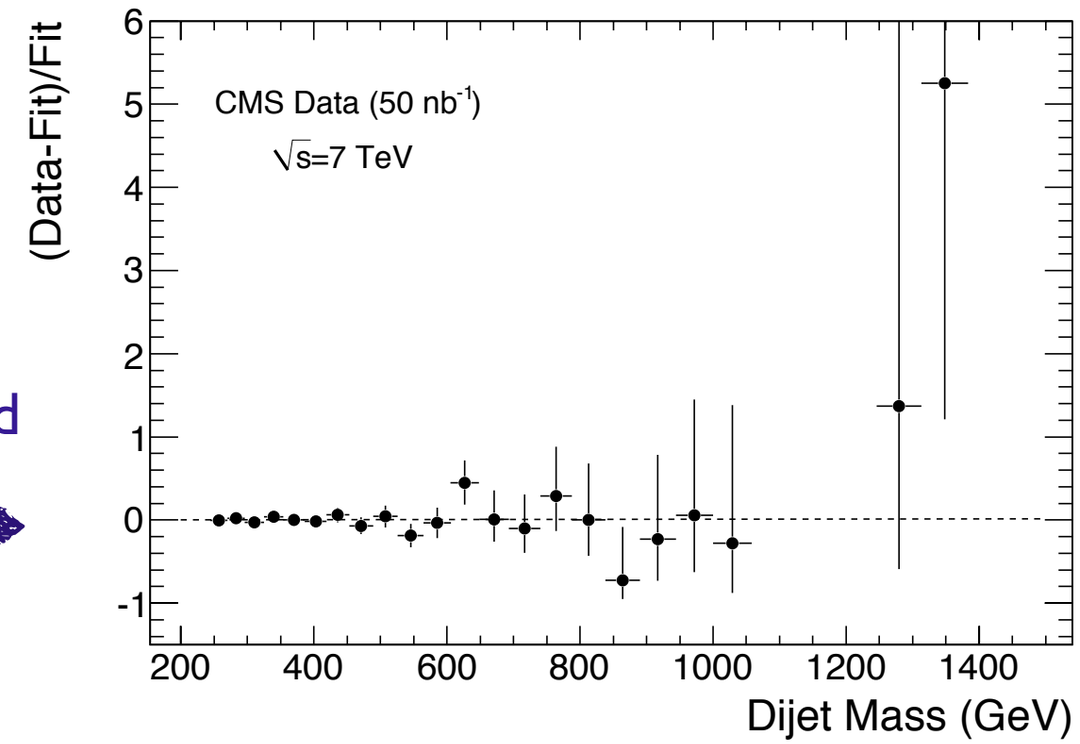


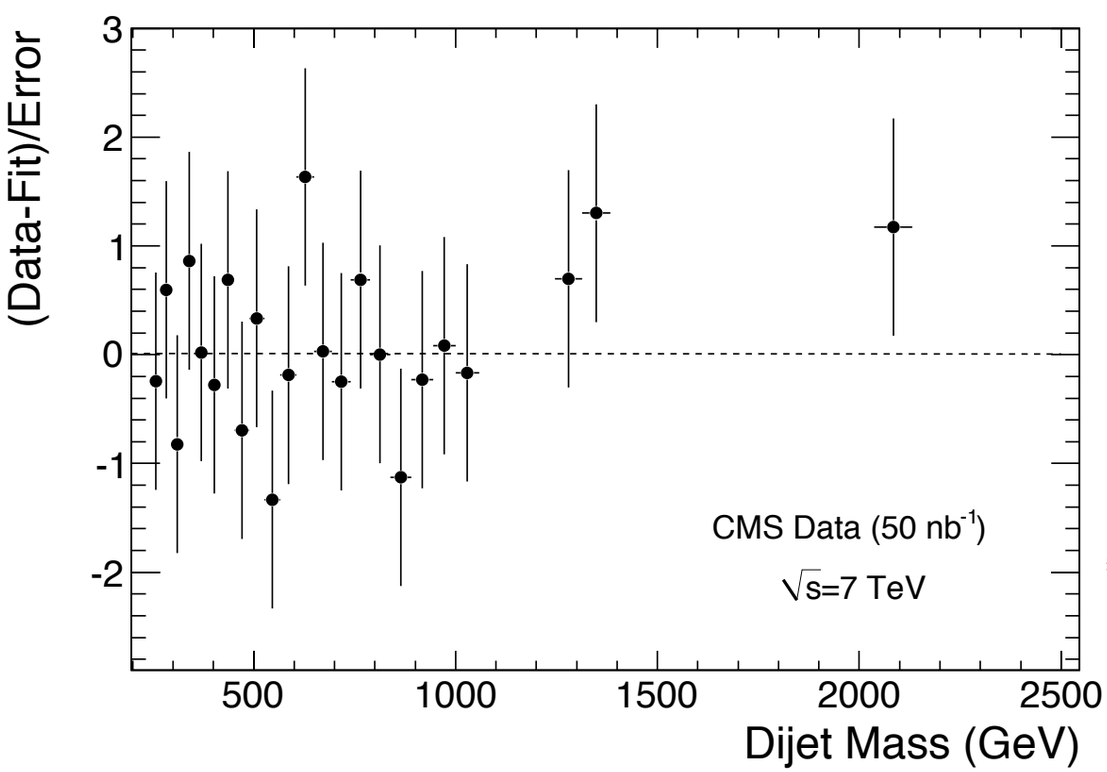
$$\frac{P_0 \cdot \left(1 - m/\sqrt{s} + P_3 \cdot (m/\sqrt{s})^2\right)^{P_1}}{m^{P_2}}$$

Data and Fit

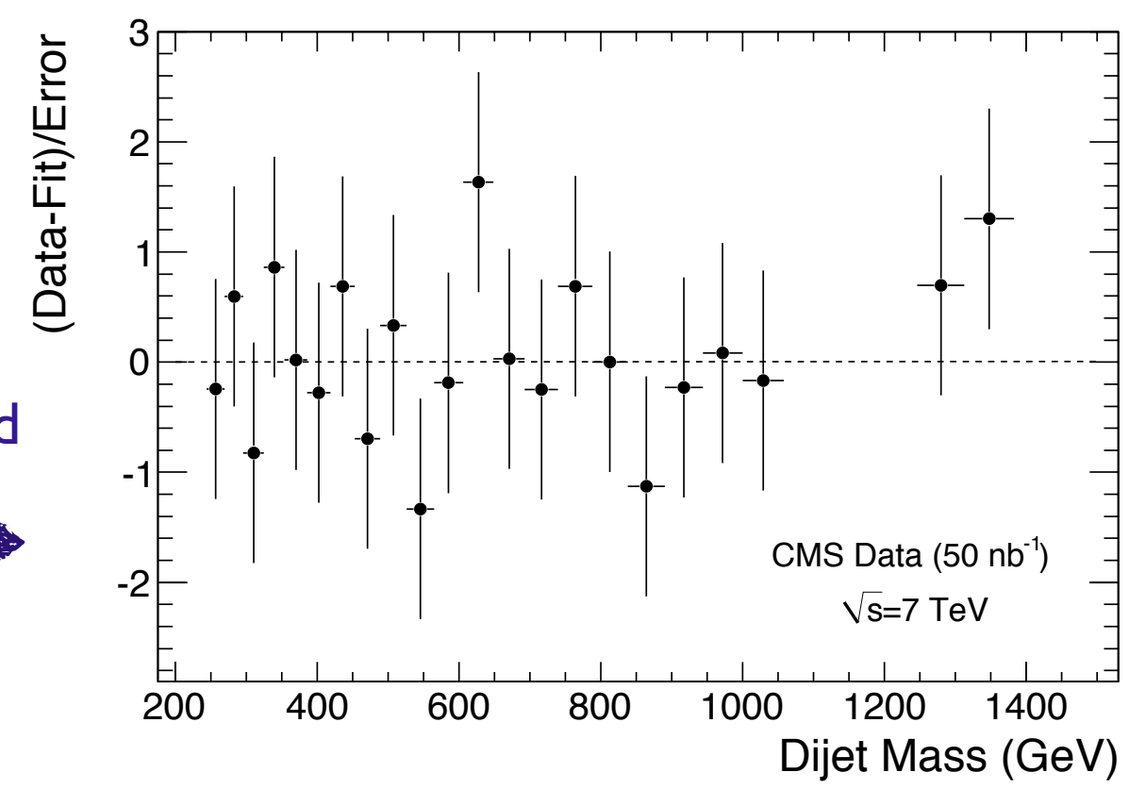


Zoomed

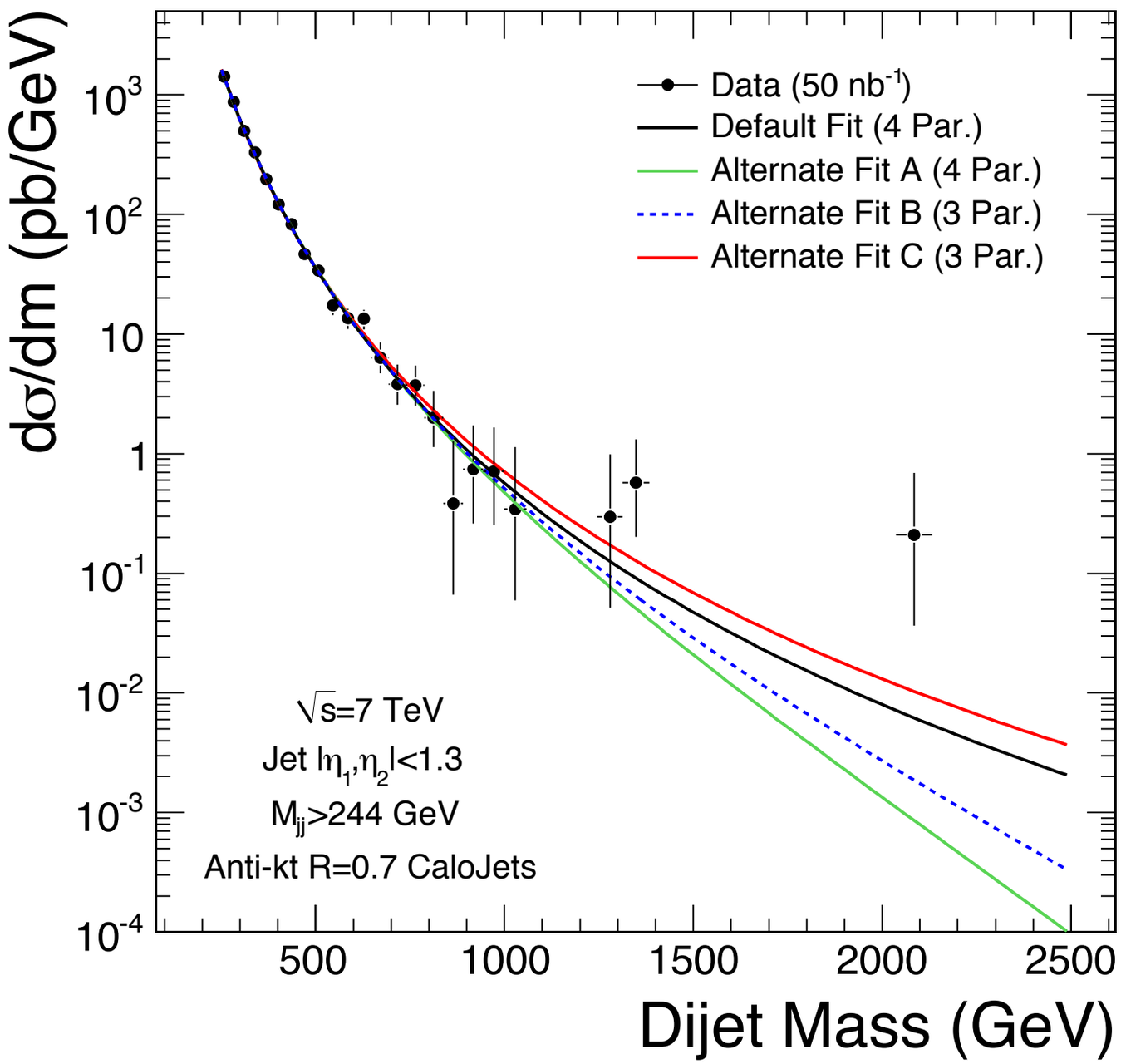




Zoomed



Another Fit Parametrization



Default

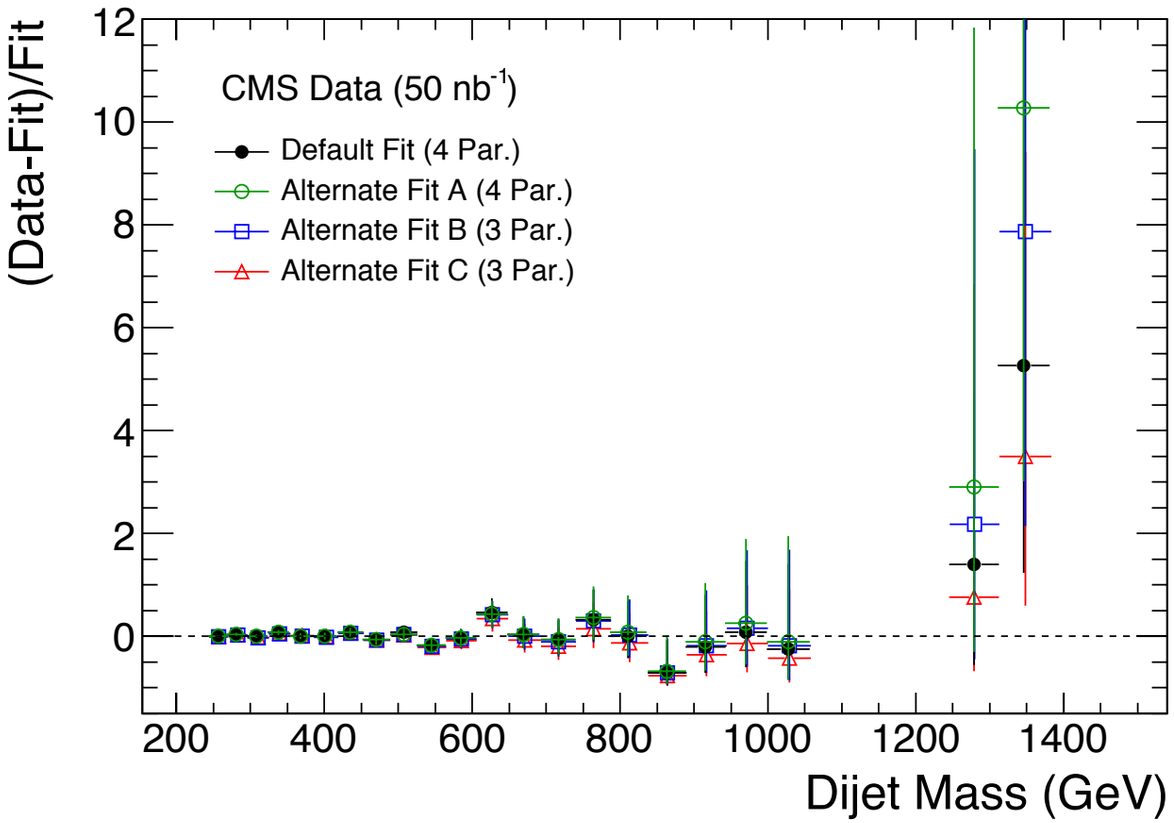
$$\frac{P_0 \cdot \left(1 - m/\sqrt{s} + P_3 \cdot (m/\sqrt{s})^2\right)^{P_1}}{m^{P_2}}$$

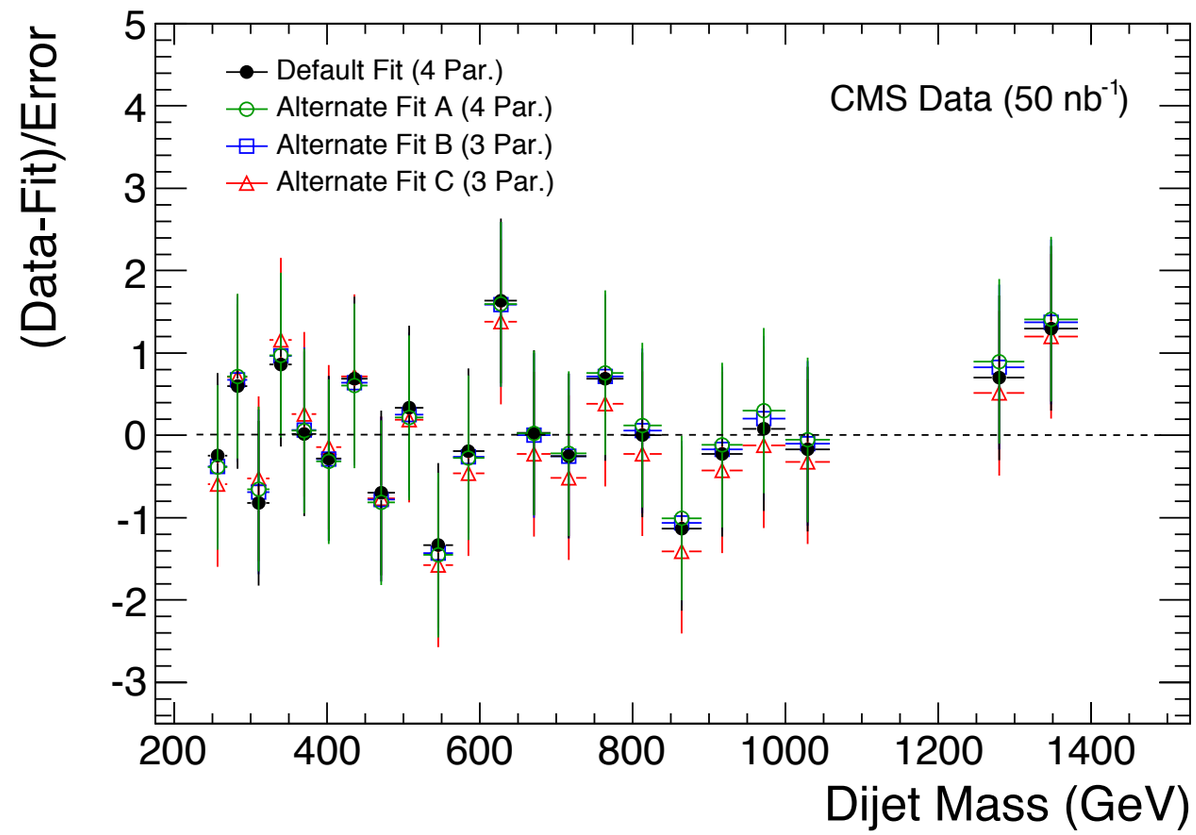
$$\frac{P_0 \cdot (1 - m\sqrt{s})^{p_1}}{(m/\sqrt{s})^{p_2 + p_3 ln(m\sqrt{s})}}$$ A

$$\frac{P_0 \cdot (1 - m/\sqrt{s})^{P_1}}{m^{P_2}},$$ B

$$\frac{P_0}{(P_1 + m)^{P_2}},$$ C

Another Fit Parametrization

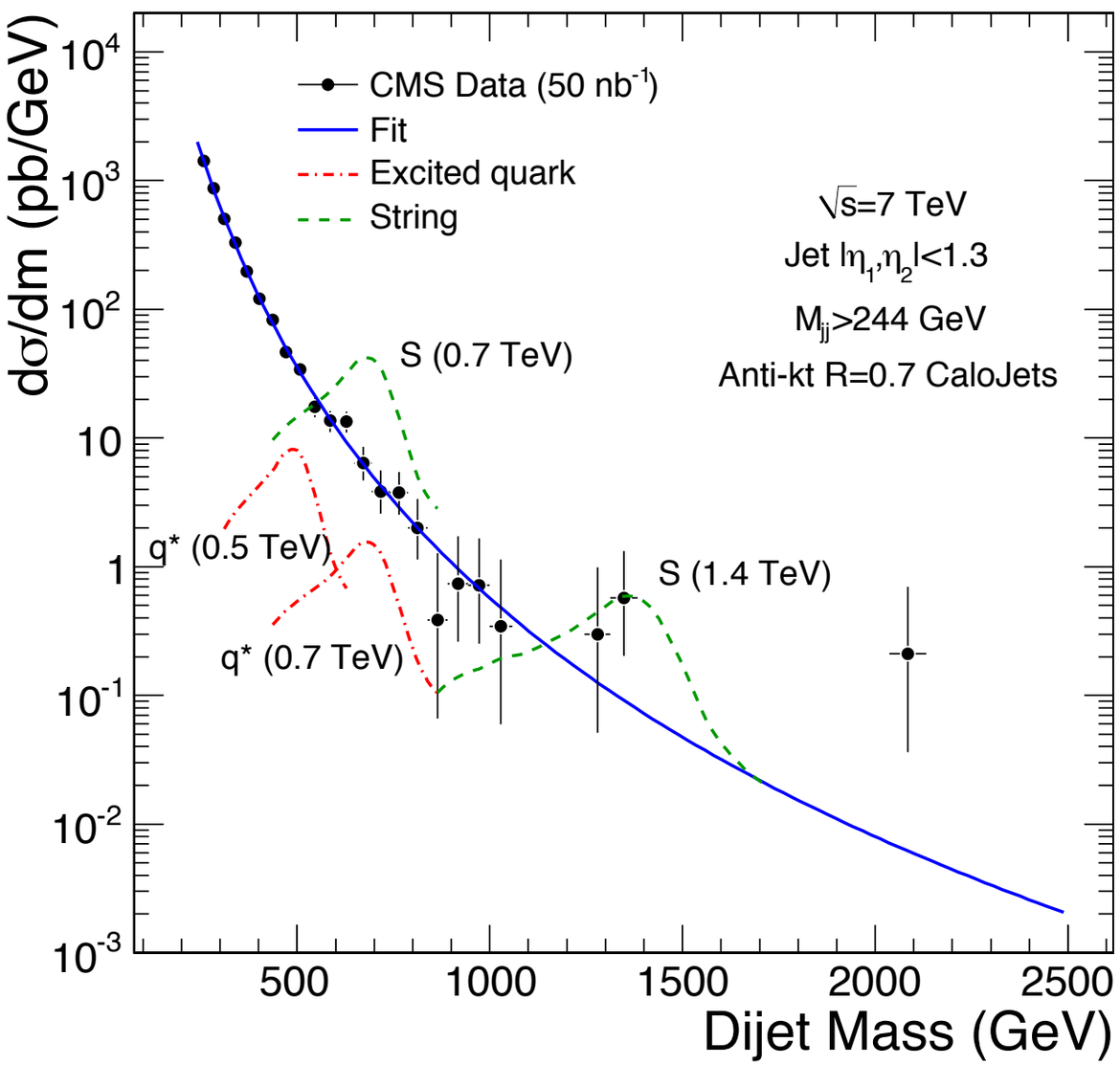


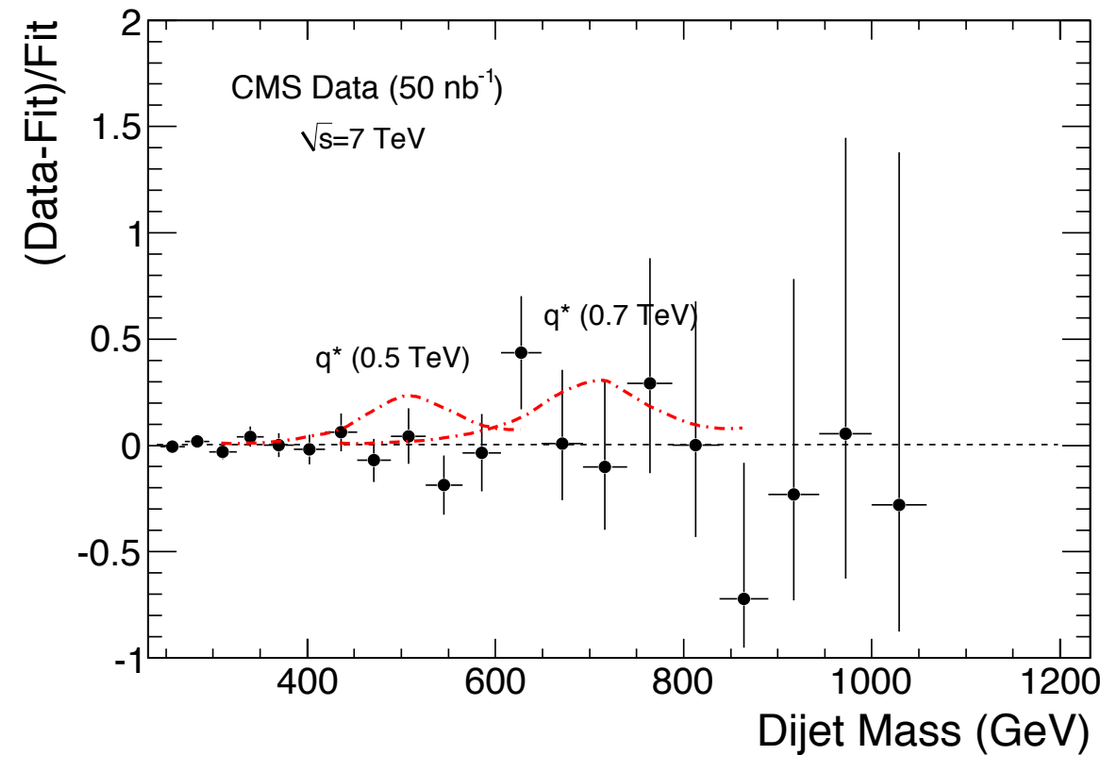


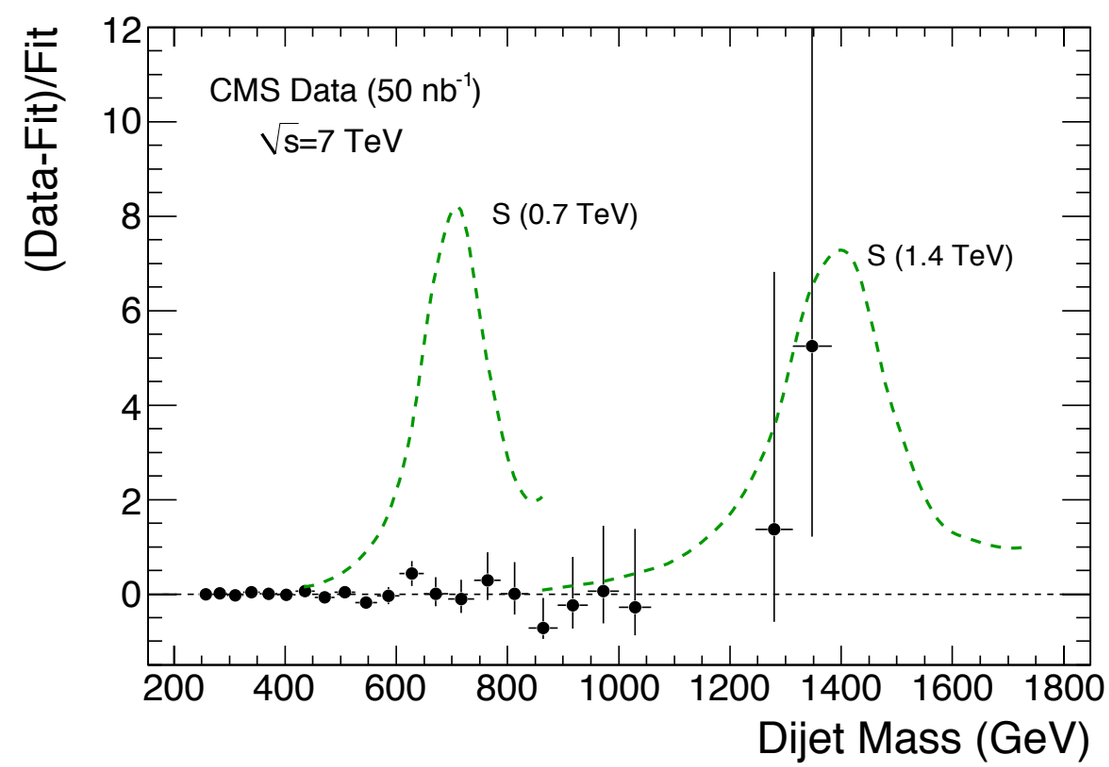

```
Chisquare/ndf for Default Fit: 12.92/19 : 0.6947
Chisquare/ndf for FitA: 13.94/19 : 0.7337
Chisquare/ndf for FitB: 13.59/20 : 0.6795
Chisquare/ndf for FitC: 14.10/20 : 0.705
```

Fit and Signal

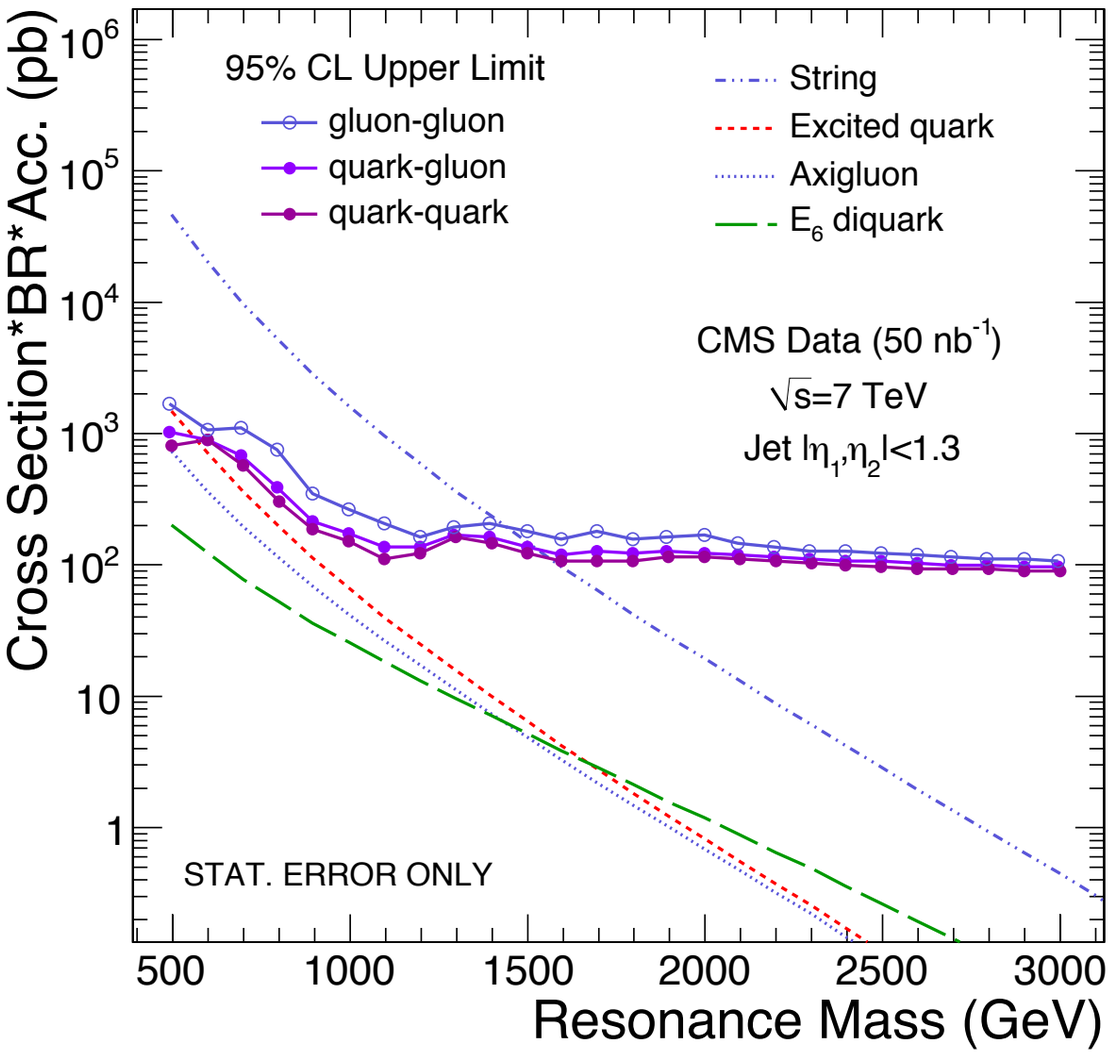
- We search for dijet resonance signal in our data.
- Excited quark signals are shown at 0.5 TeV and 0.7 TeV.
- String resonance signal is shown at 1 TeV. and 1.4 TeV.



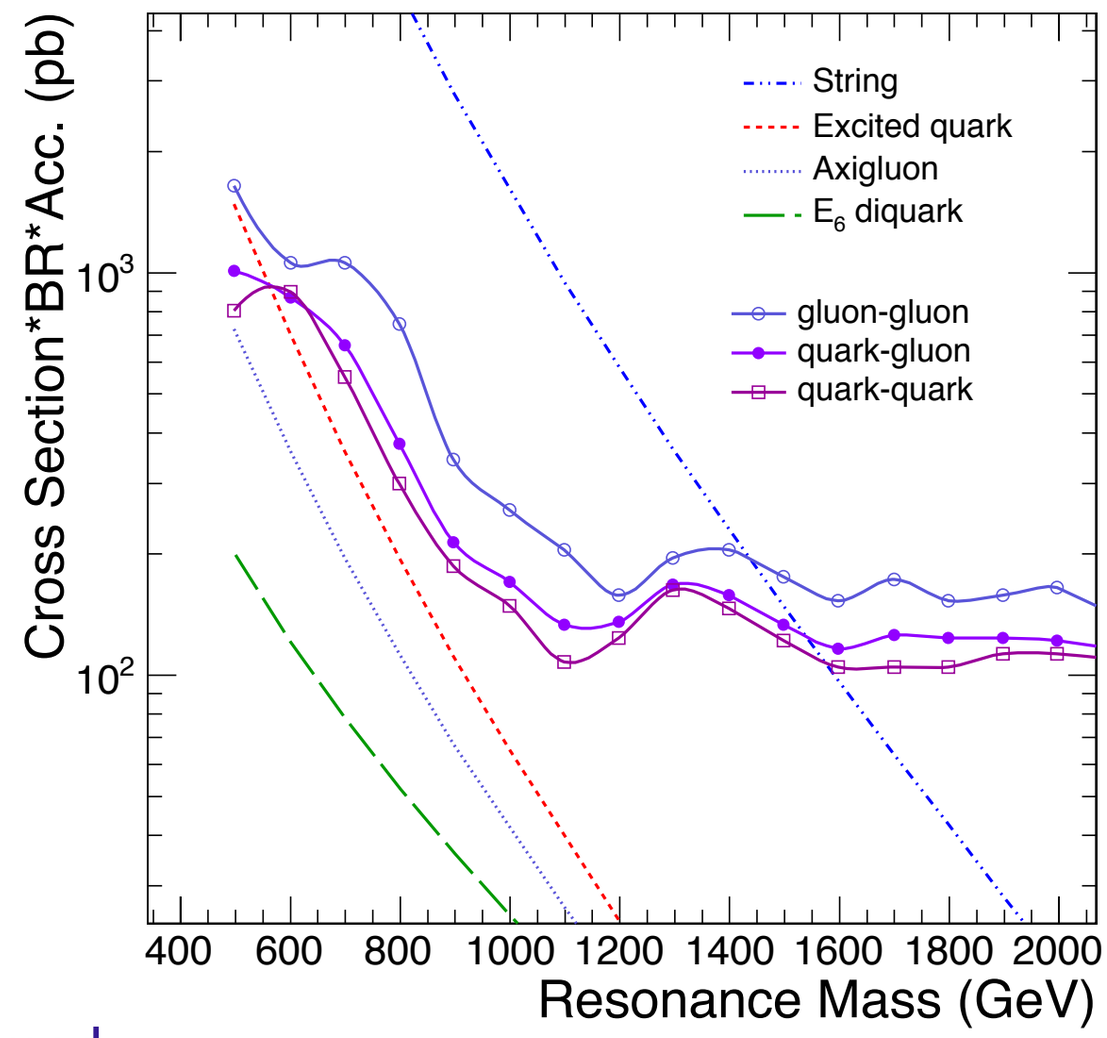




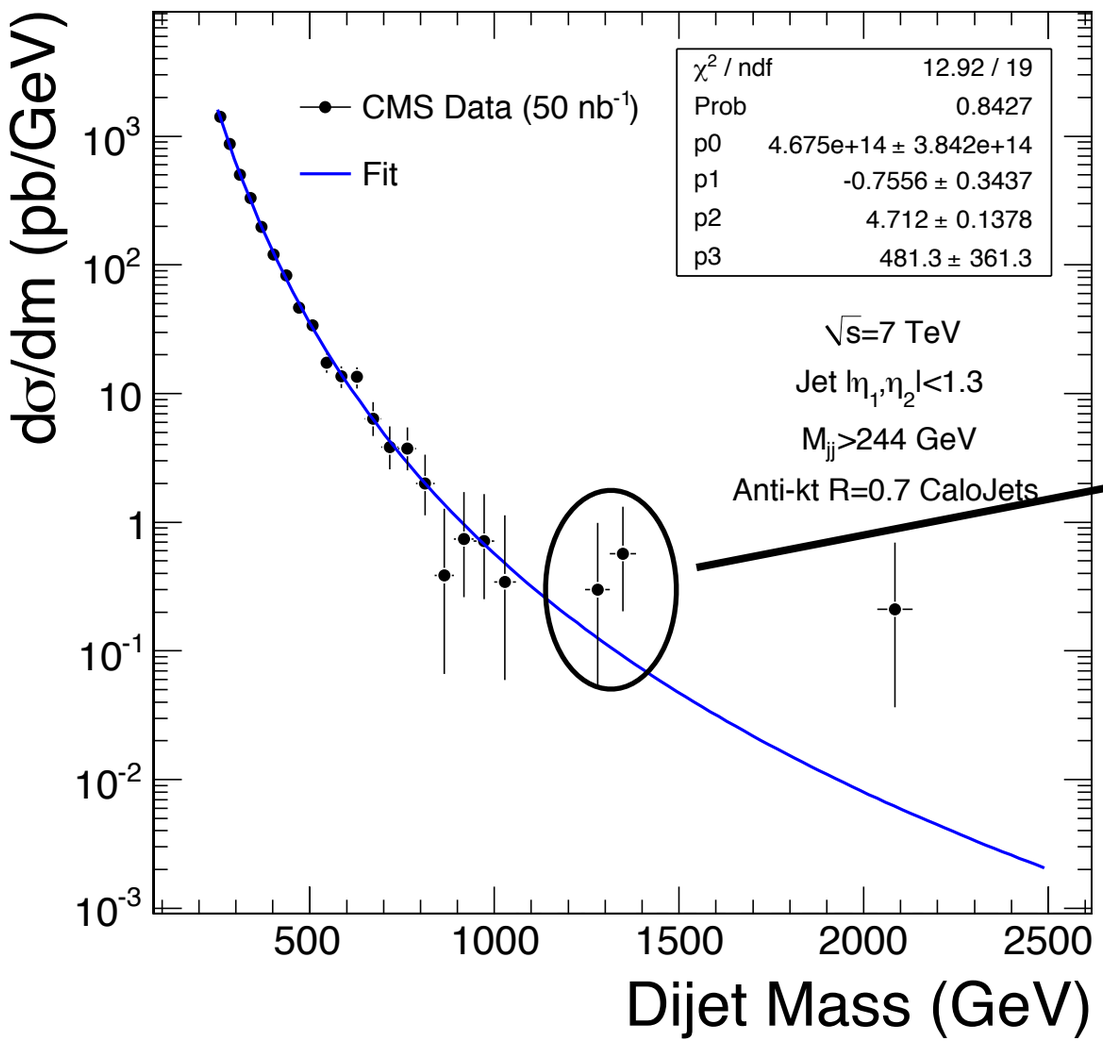
Early Limits with Statistical Uncertainties Only



Zoomed



Comparison Limits

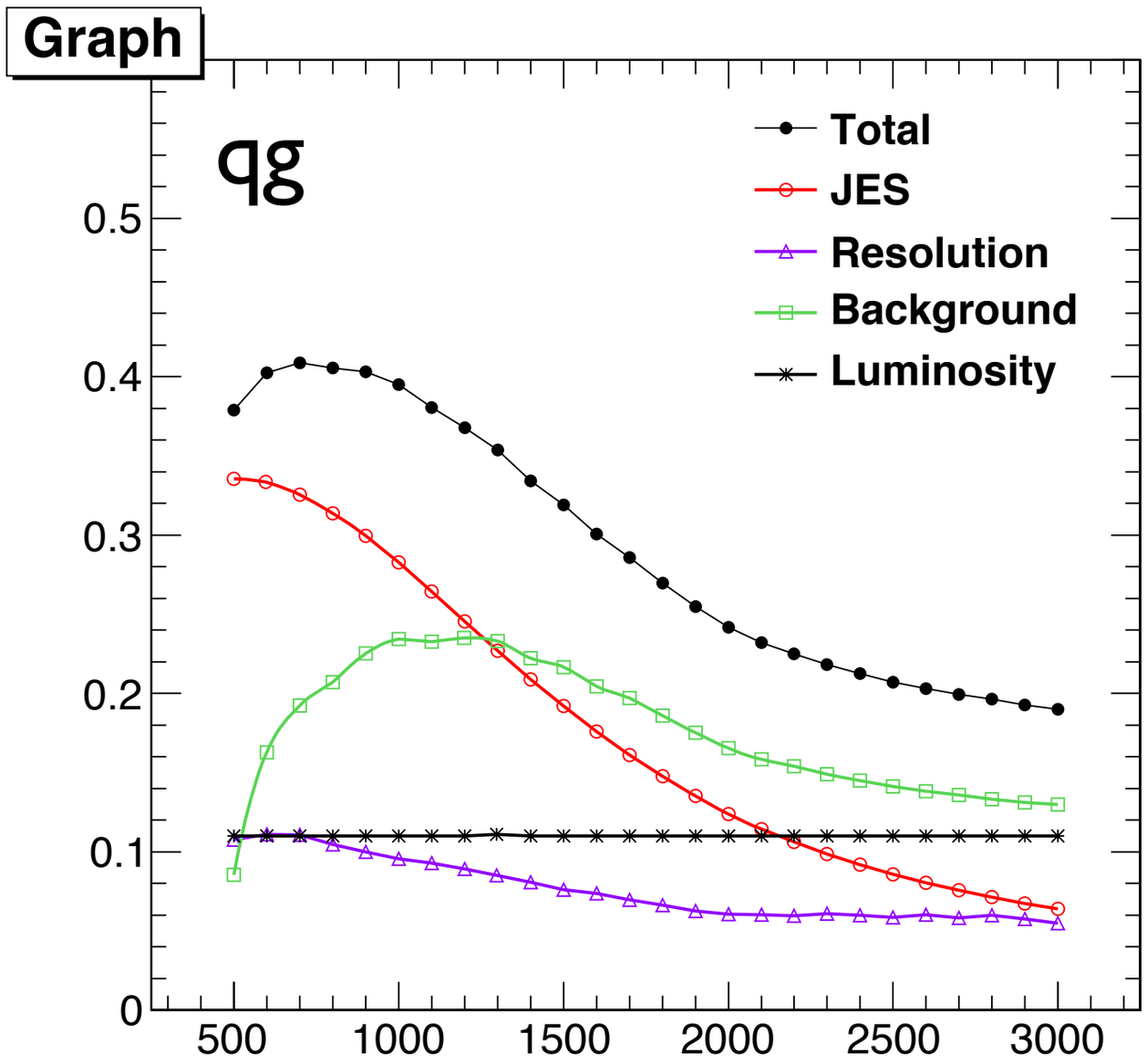


	$1-\alpha$ =90%		$1-\alpha$ =95%	
n	$\nu_{\rm lo}$	$\nu_{\rm up}$	$\nu_{\rm lo}$	$\nu_{\rm up}$
0	–	2.30	–	3.00
1	0.105	3.89	0.051	4.74
2	0.532	5.32	0.355	6.30
3	1.10	6.68	0.818	7.75
4	1.74	7.99	1.37	9.15
5	2.43	9.27	1.97	10.51
6	3.15	10.53	2.61	11.84
7	3.89	11.77	3.29	13.15
8	4.66	12.99	3.98	14.43
9	5.43	14.21	4.70	15.71
10	6.22	15.41	5.43	16.96

(7.75 event)/(50 nb^-1) = 155 pb

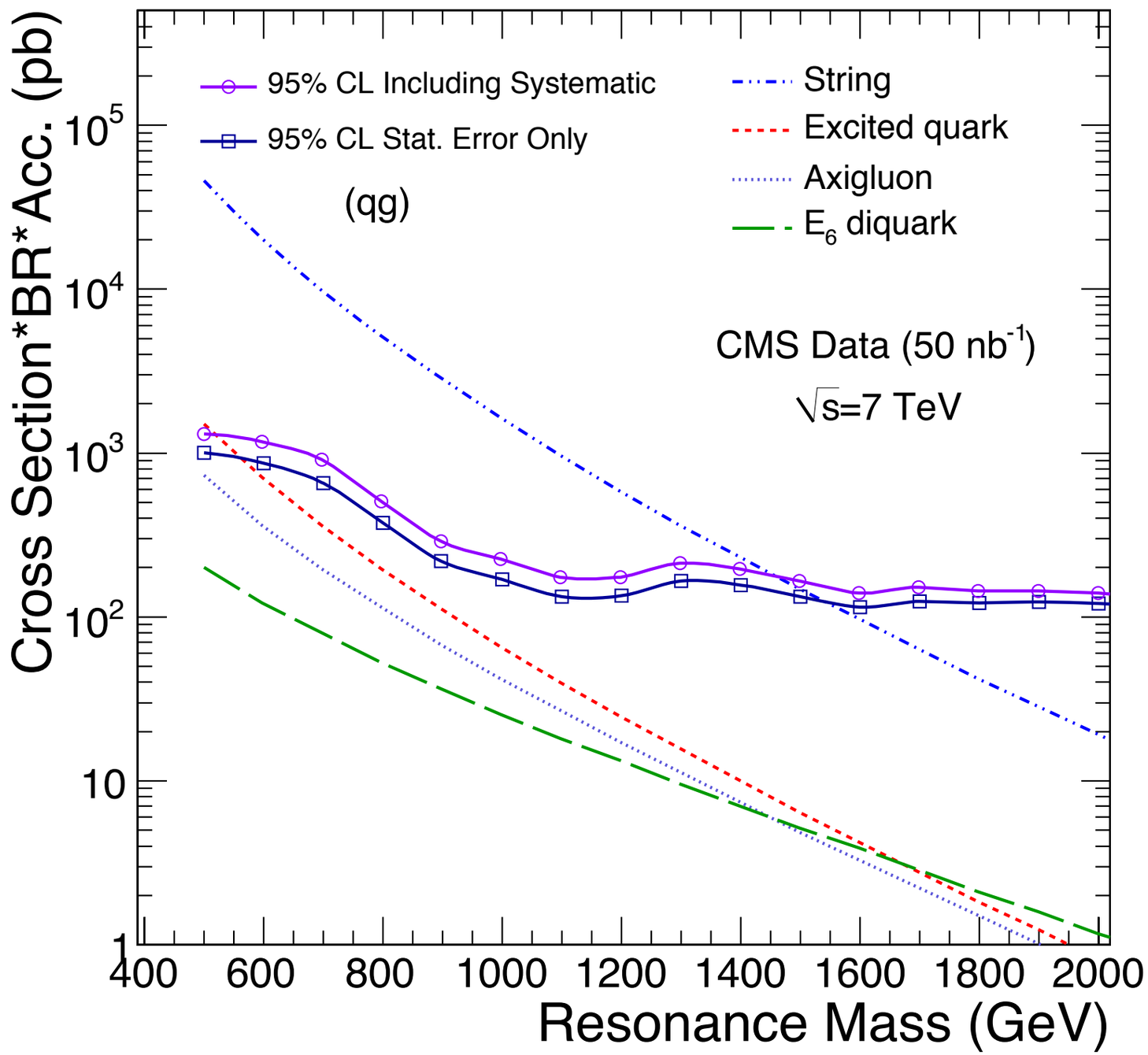
- Our result at 1.3 TeV
  - ✓ 166 pb

Systematics

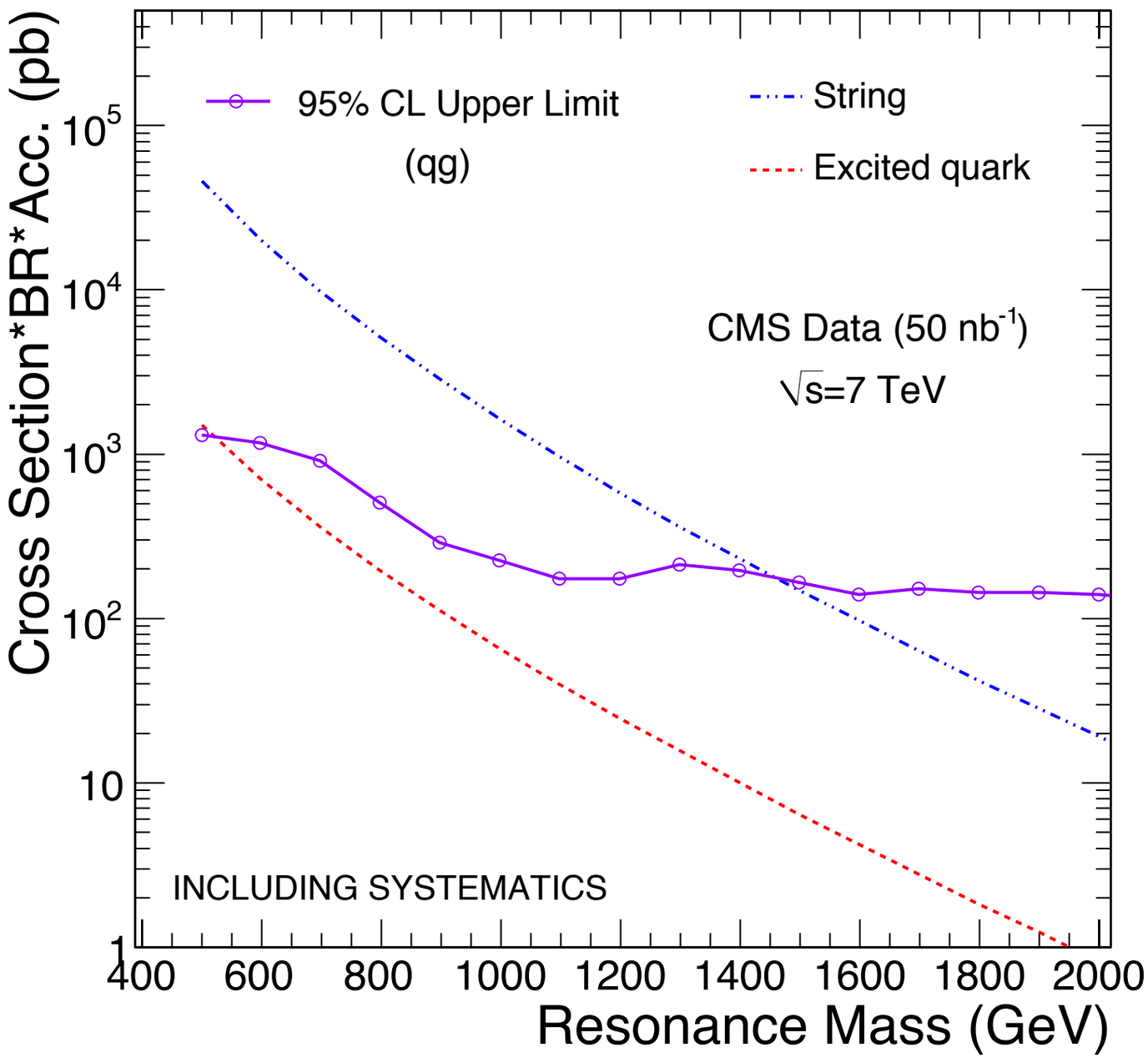


- Total systematic uncertainty varies from 19% to 41% depending on resonance mass.

Effect of Systematics on Limit



Limit for qg resonances



- We excluded
  - ✓ String resonances of mass **M<1.45 TeV** at 95% CL.
  - ✓ Excited quark of mass **M<0.52 TeV** at 95% CL.