DIS08
UCL London, April 10, 2008

Jets and etc.

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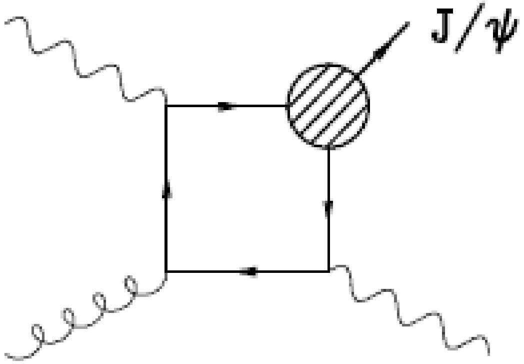
LPTHE Paris

J/psi + gamma photoproduction

MC, Greco,Kraemer, PRD 55 (1997) 7126

Direct photon

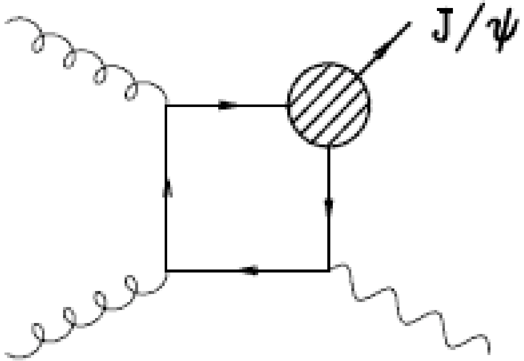
a)

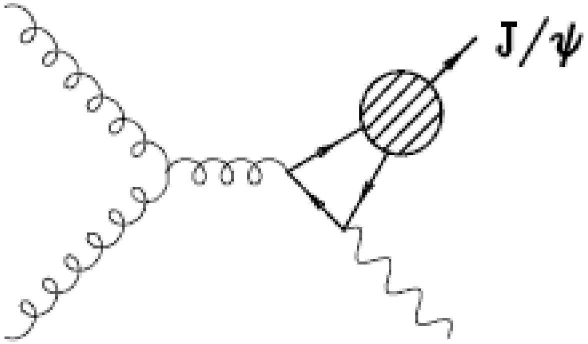


Color octet only
-- new --

Resolved photon

b)



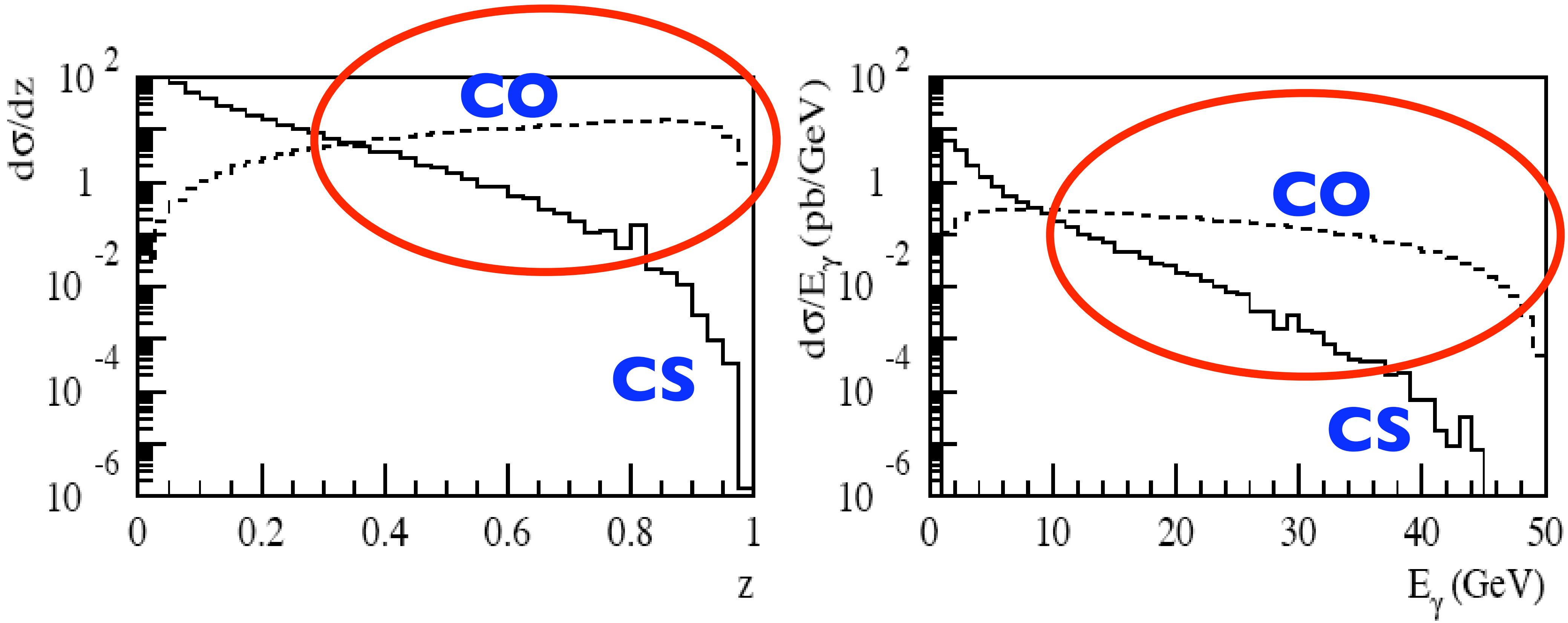


Color singlet possible

Color octet only
-- new --

J/psi + gamma photoproduction

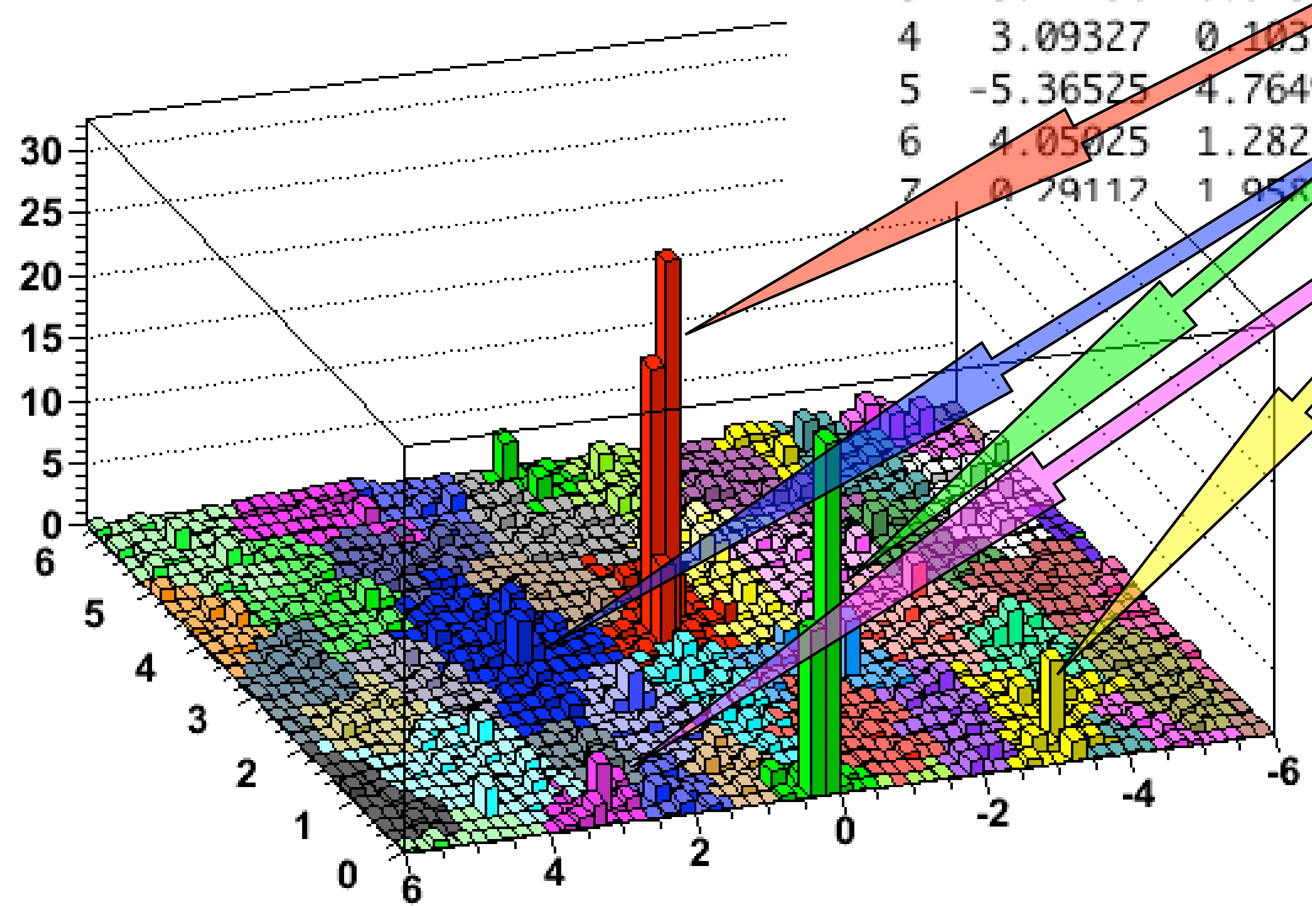
z distribution of J/psi or photon



Color octet gives distinctive signature at large z

Jet areas

```
iev 0 (irepeat 24): number of particles = 1428
strategy used =  NlnN
number of particles = 9051
Total area: 76.0265
Expected area: 76.0265
 ijet    eta        phi         Pt          area  +-   err
    0   0.15050   3.24498     69.970      2.625 +-   0.020
    1   0.18579   0.13150     59.133      1.896 +-   0.020
    2   2.33840   3.23960     31.976      4.749 +-   0.028
    3  -3.41796   0.52394     26.595      3.084 +-   0.021
    4   3.09327   0.10350     20.072      2.688 +-   0.023
    5  -5.36525   4.76491     19.596      2.780 +-   0.012
    6   4.05025   1.28279     15.361      3.592 +-   0.028
    7   0.79112   1.95845     14.566      2.114 +-   0.018
```



The ghost can also give you a visual impression of the reach of each jet

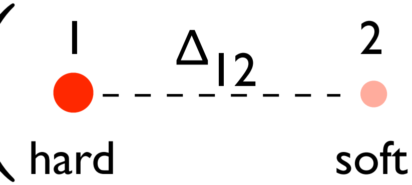
Most importantly, they mimic the sensitivity of the jet clustering to a soft background

Jet areas

MC, Salam, Soyez, arXiv:0802.1189

Finally, weigh the probability of emission of the soft particle with the leading QCD matrix element:

$$\langle \Delta area \rangle = \int C_1 \frac{\alpha_s(p_{t2}\Delta_{12})}{\pi} \frac{dp_{t2}}{p_{t2}} \left[\frac{d\Delta_{12}}{\Delta_{12}}\right]_+ \left(\quad \right)$$



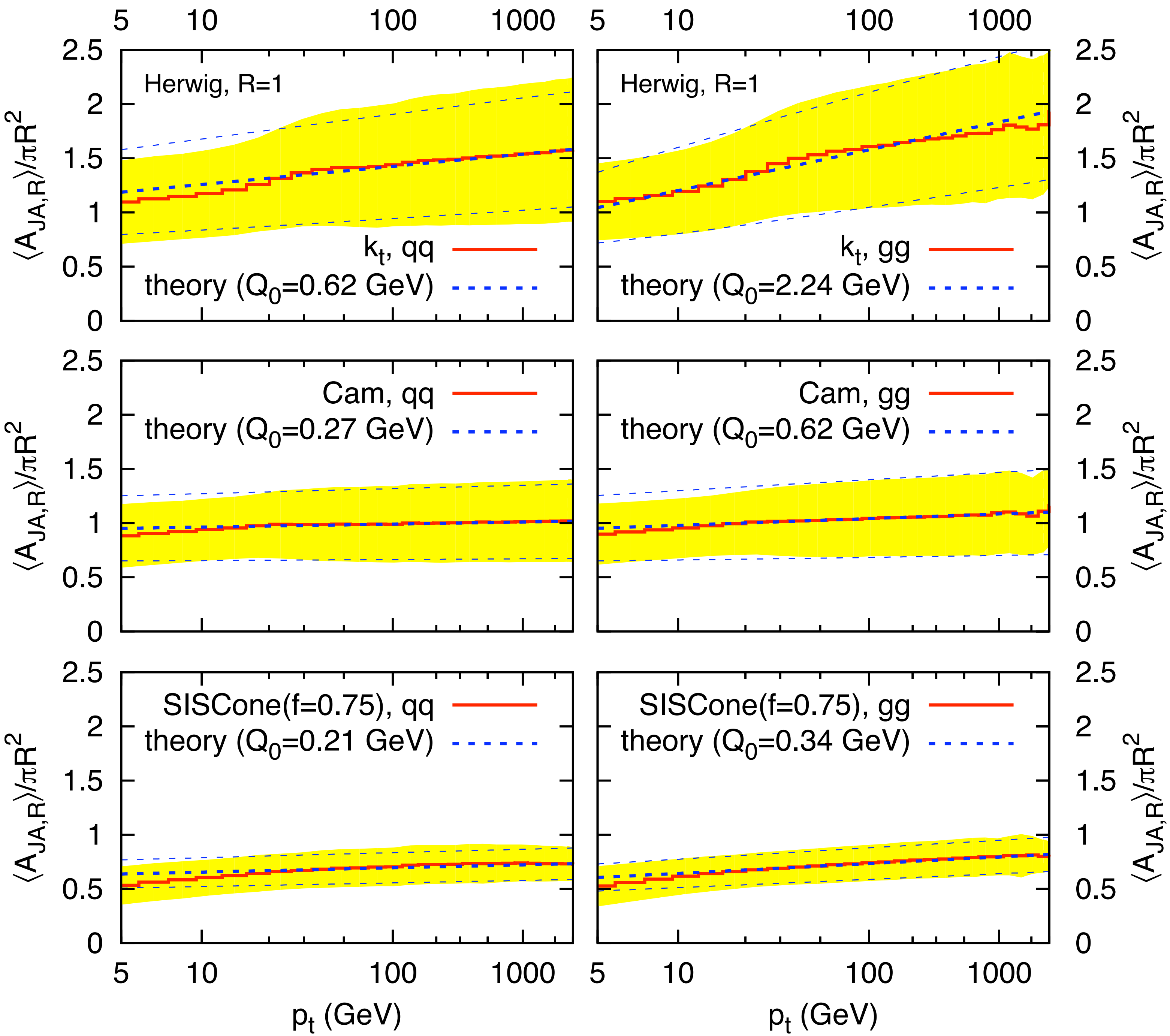
The result is an **anomalous dimension**:
areas change with transverse momentum of the jet in a predictable way:

$$\langle \Delta area \rangle = d \; \frac{C_1}{\pi b_0} \ln \frac{\alpha_s(Q_0)}{\alpha_s(R p_{t1})}$$

In a similar way one can also predict the evolution of the dispersion, calculating

$$\langle \Delta\, area^2 \rangle = s^2 \; \frac{C_1}{\pi b_0} \ln \frac{\alpha_s(Q_0)}{\alpha_s(R p_{t1})}$$

Jet area scaling violations at (simulated) LHC



Averages and dispersions evolution from Monte Carlo simulations in good agreement with simple LL calculations

Area scaling violations are a legitimate observable!

(Though it might not be the best place where to measure α_s ....)

Jet area scaling violations at (simulated) LHC

Check anti-k_t behaviour: scaling violations indeed absent, as predicted