

More NLO comparisons

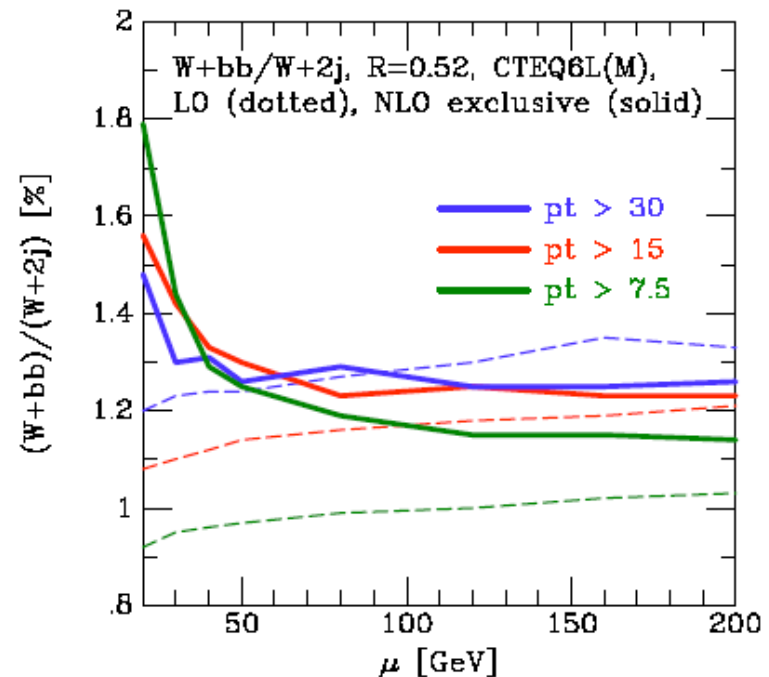
J. Campbell

J. Huston

Method 2 at NLO



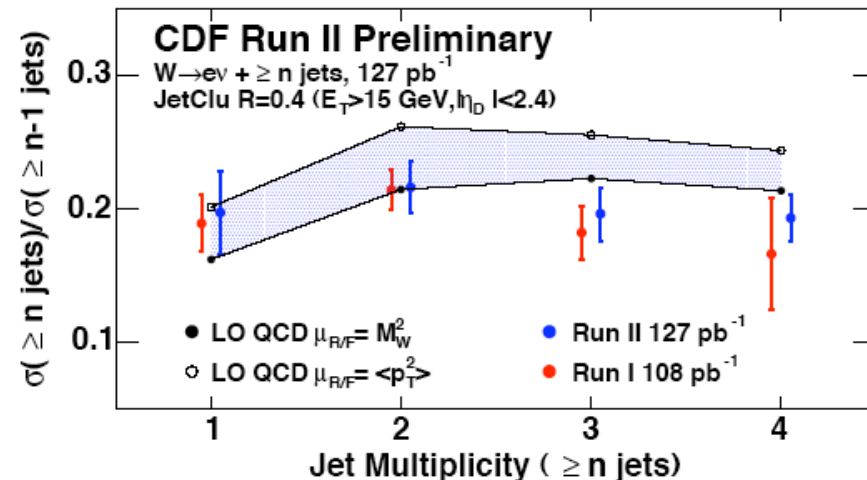
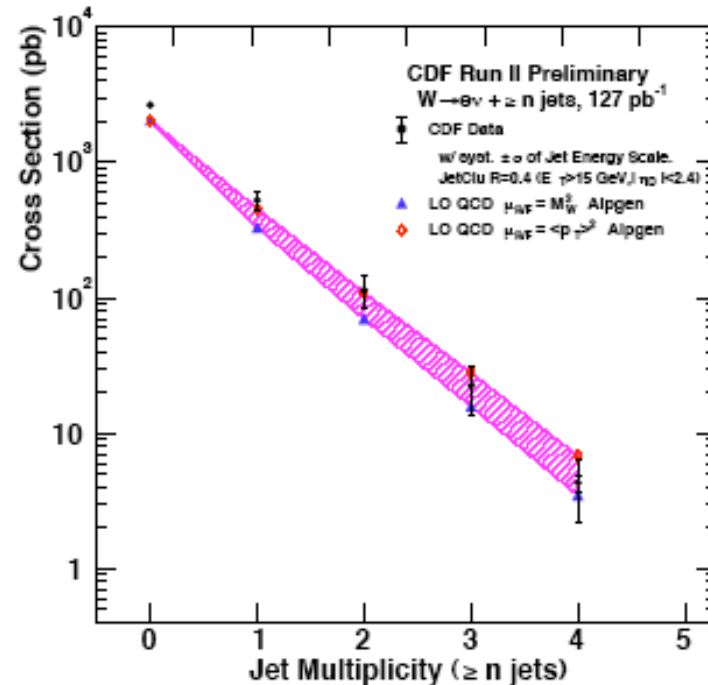
- In CDF 6849, we used MCFM to calculate the heavy flavor fraction in W +jets events in order to try to test the efficacy of Method 2
- The natural next step is to produce MCFM NLO cross section predictions for comparison with the CDF Run 2 data



MCFM predictions



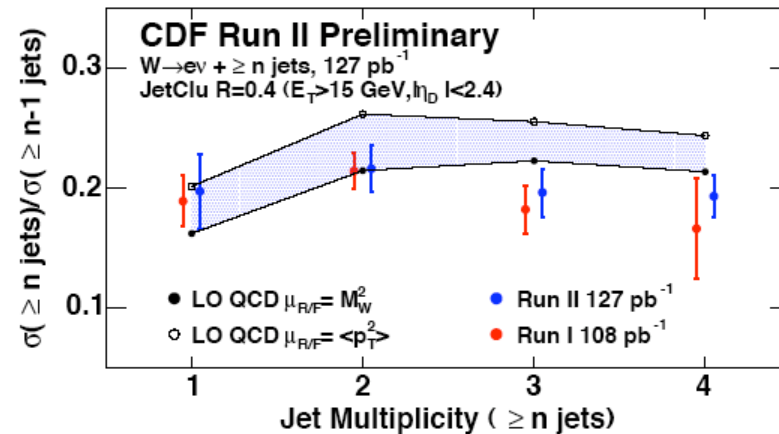
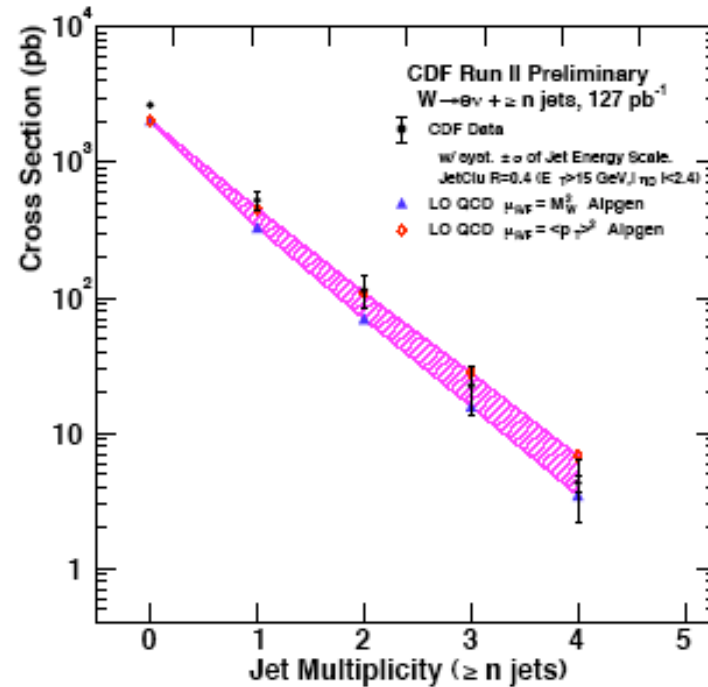
- Andrea and others have produced comparisons of LO predictions to Run 2 data
 - ◆ but with the data in a non-friendly form, where backgrounds and efficiencies have not been corrected for
- Goal is to present the data as an absolute cross section so that any theorist can compare their predictions
 - ◆ have to correct for backgrounds, efficiencies, smearing, hadronization
 - ▲ I'll talk about hadronization corrections at next week's QCD meeting
 - ◆ work in progress with Ben Cooper, Jay Dittmann, Dave Gerdes and Mitch Soderburg
- As a first step, try smearing the theory for comparison to the data
 - ◆ similar to what Jay did for NLO comparisons in Run 1



MCFM predictions



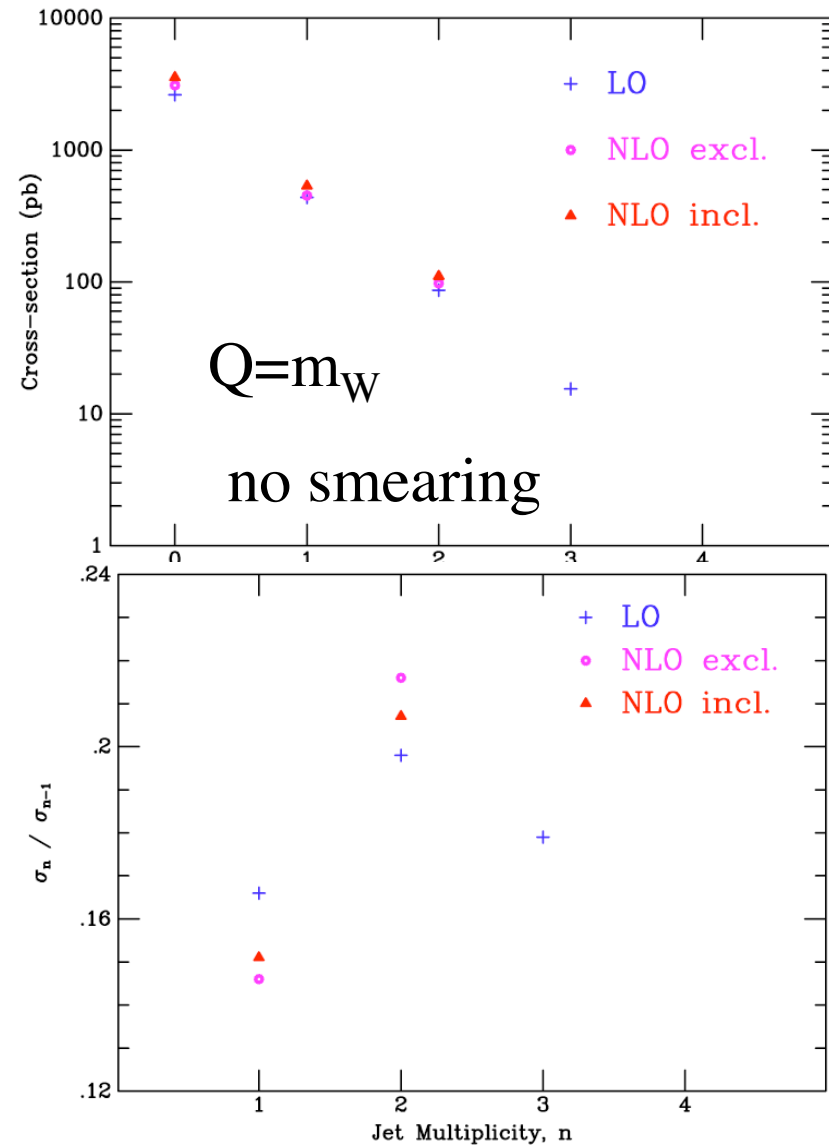
- What I have to show so far is just at the beginning
- Cuts used
 - ◆ $p_T^{\text{electron}} > 20 \text{ GeV}$
 - ◆ $|\eta^{\text{electron}}| < 1.1$
 - ◆ $p_T^{\text{neutrino}} > 30 \text{ GeV}$
 - ▲ 20 GeV for top
 - ◆ $\Delta R(\text{electron-jet}) > 0.52$
 - ▲ no ΔR cut for top
 - ◆ $R_{\text{cone}} = 0.4$
 - ◆ $E_T^{\text{jet}} > 15 \text{ GeV}/c; |\eta^{\text{jet}}| < 2.4$
 - ▲ $|\eta^{\text{jet}}| < 2.0$ for top



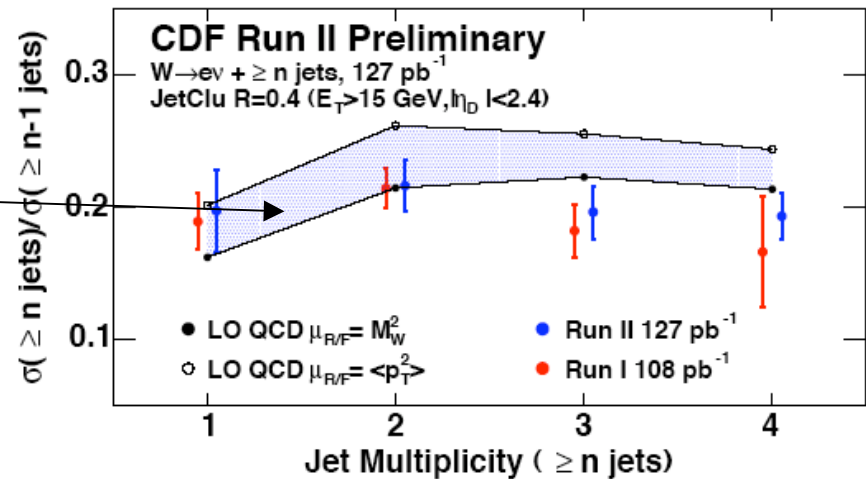
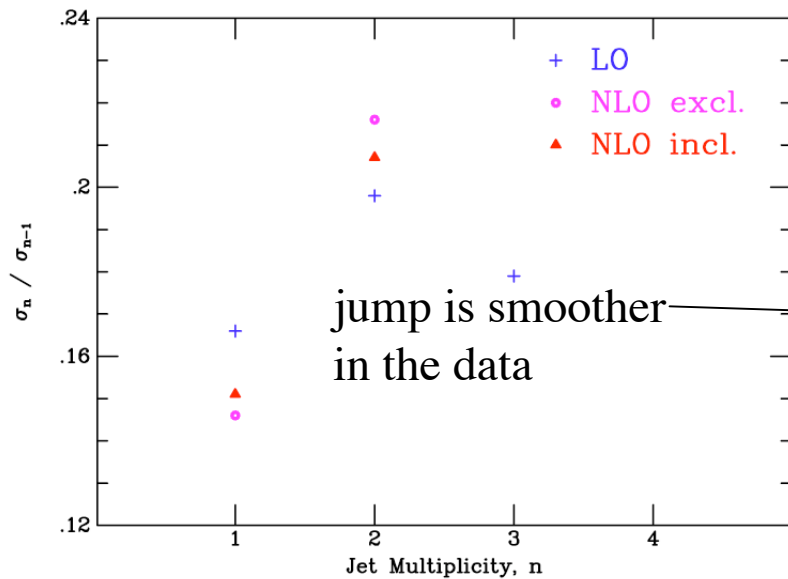
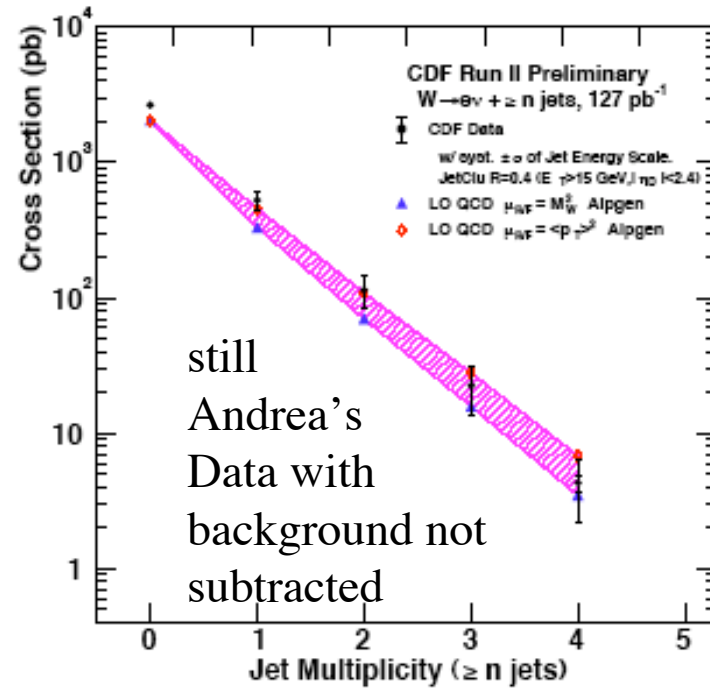
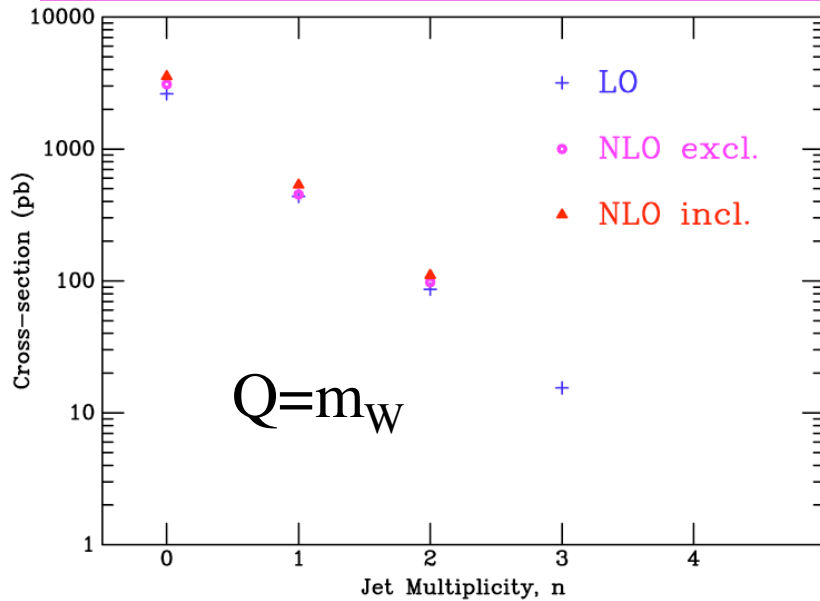
MC FM predictions



- LO means LO
- NLO exclusive means either exactly 0, 1 or 2 jets in the final state
 - ◆ note that $W+2$ jets at NLO is something we did not have in Run 1
- NLO inclusive means \geq 0, 1, 2 jets in the final state
- Note that jump from 1 to 2 jet multiplicity is larger at NLO than at LO



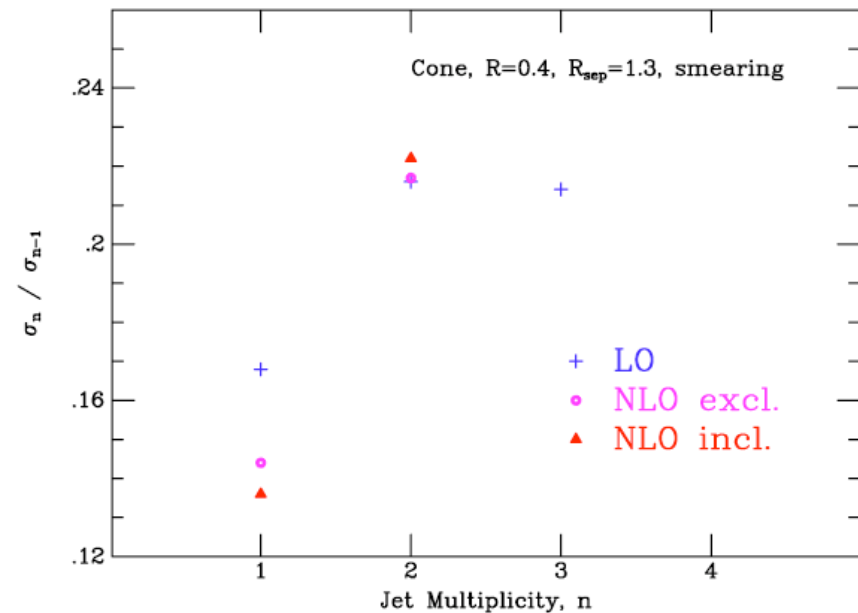
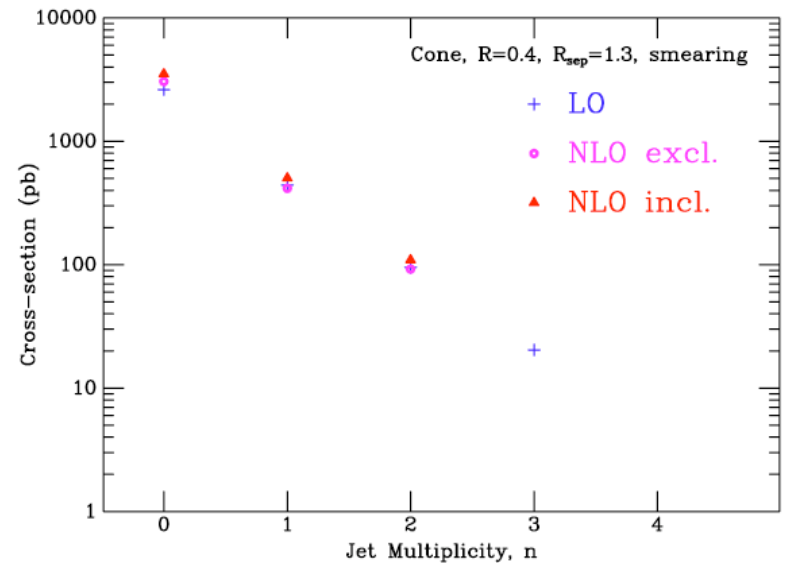
Compare to data



Add smearing



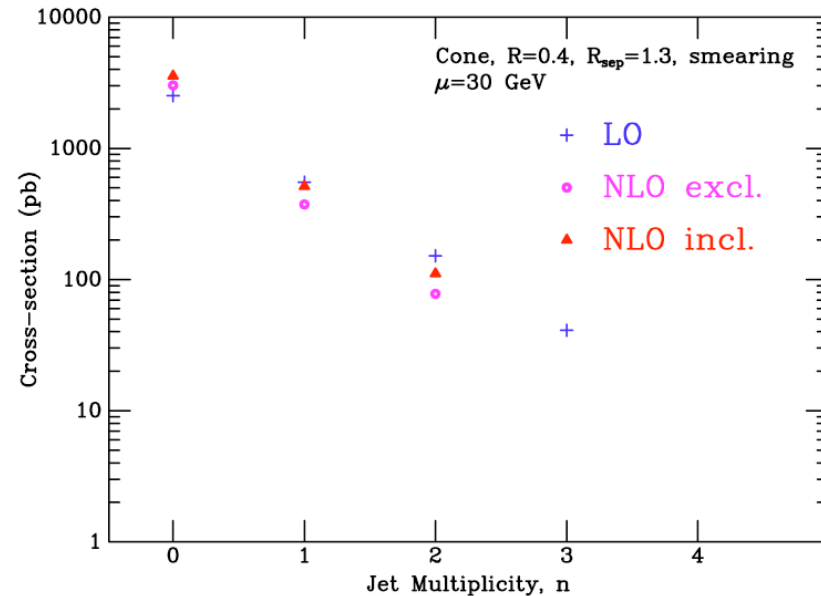
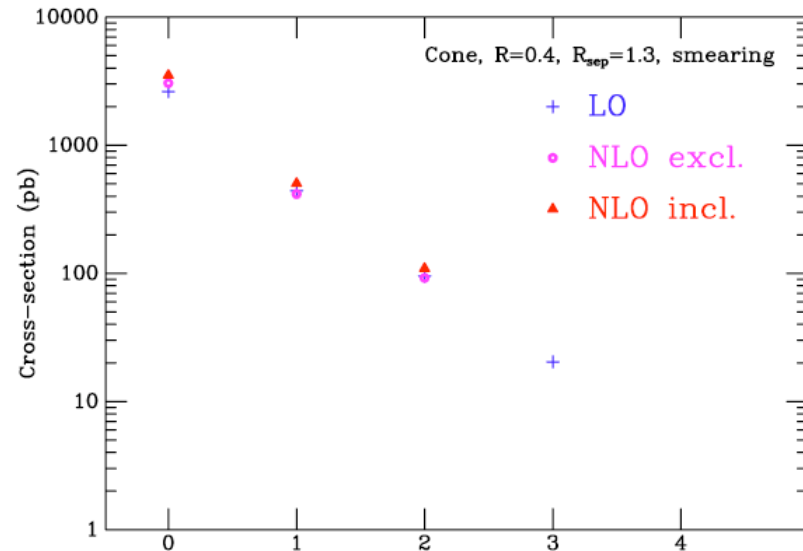
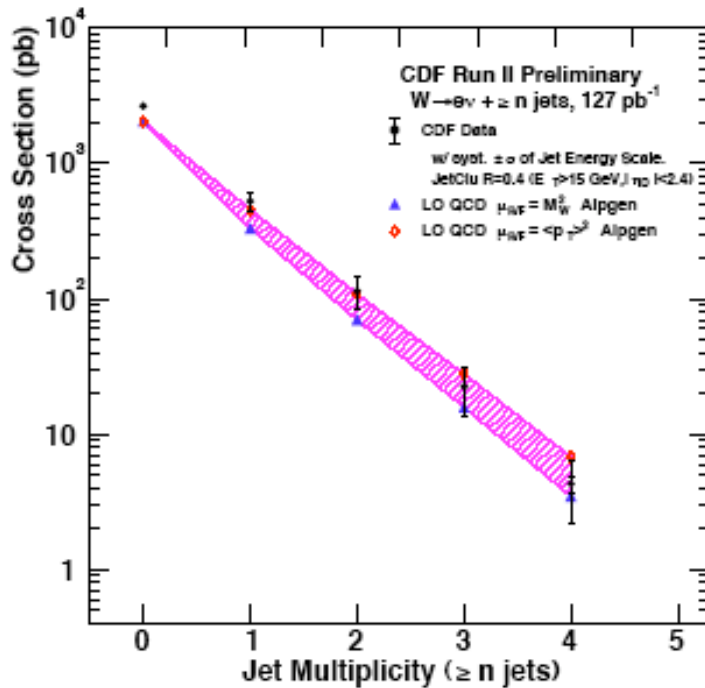
- Add a Gaussian smearing to the data using a simplified form from Jay's thesis
 - ◆ Jay has a somewhat more sophisticated form of the smearing which we haven't used yet with MCFM
- Not much of an impact
 - ◆ "...it's quiet, too quiet"
 - ◆ need to check what the smearing is doing



Look at scale dependence



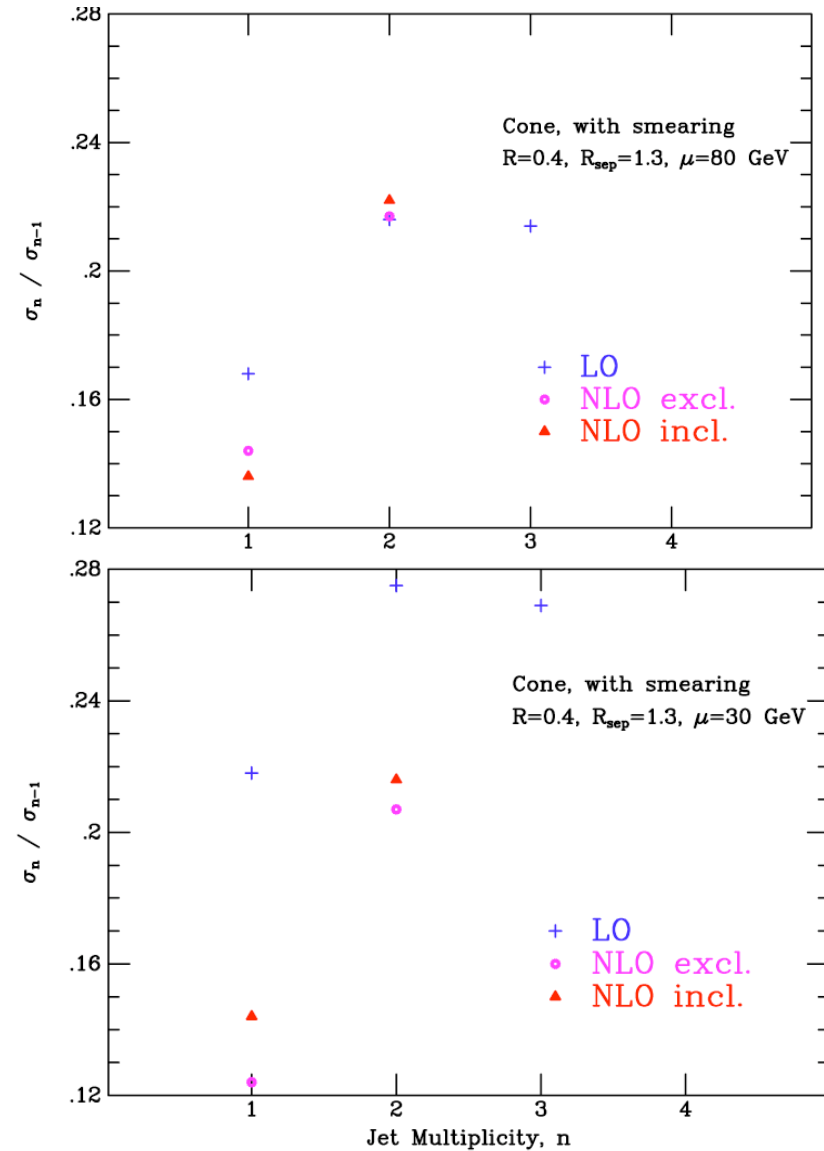
- The top plot shows a scale of m_W , the bottom plot of 30 GeV
- Biggest impact on LO, as you would expect
- Scale dependence at NLO greatly reduced



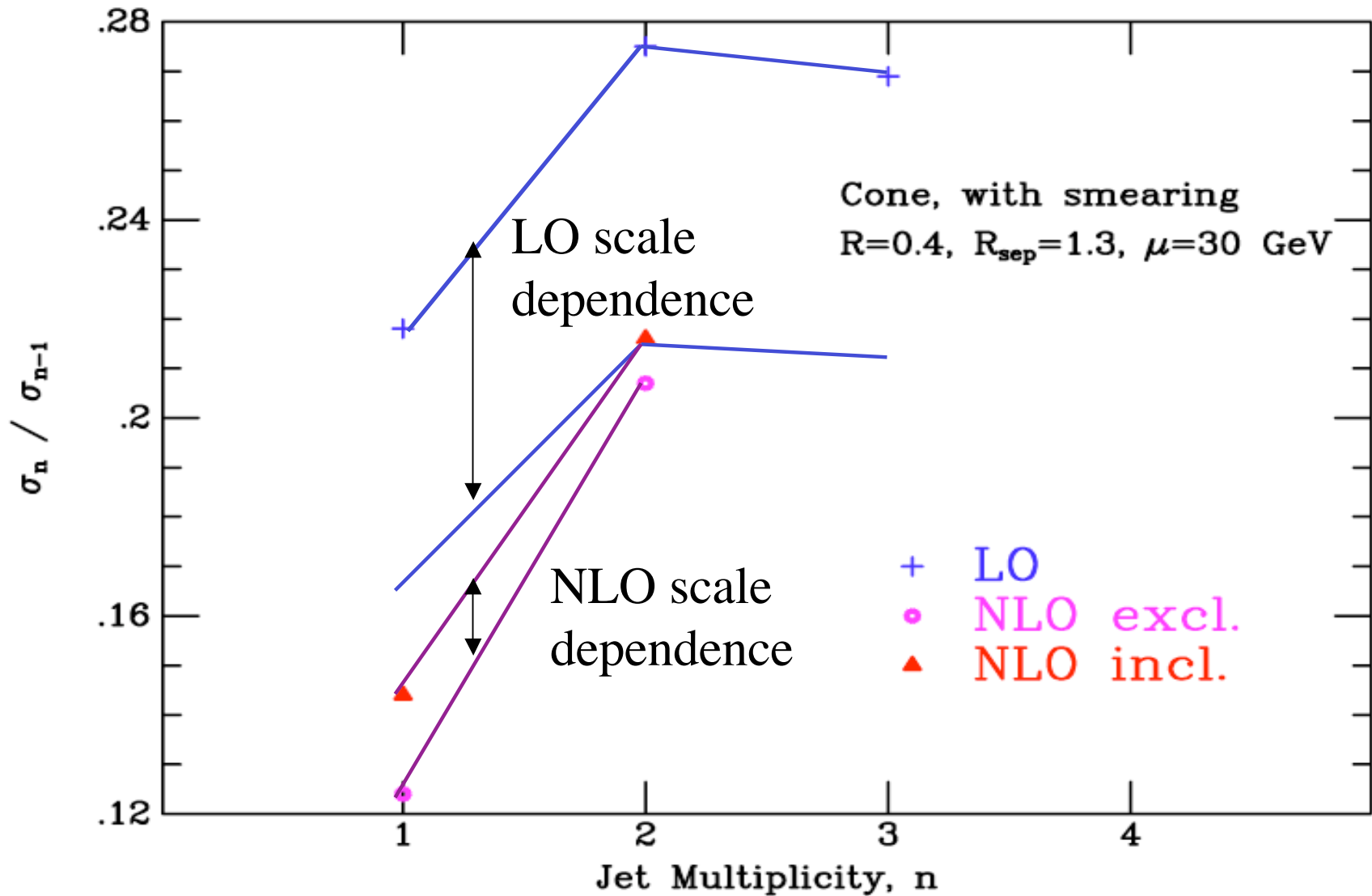
Scale dependence



- NLO impact easier to see on the cross section ratios



Scale dependence

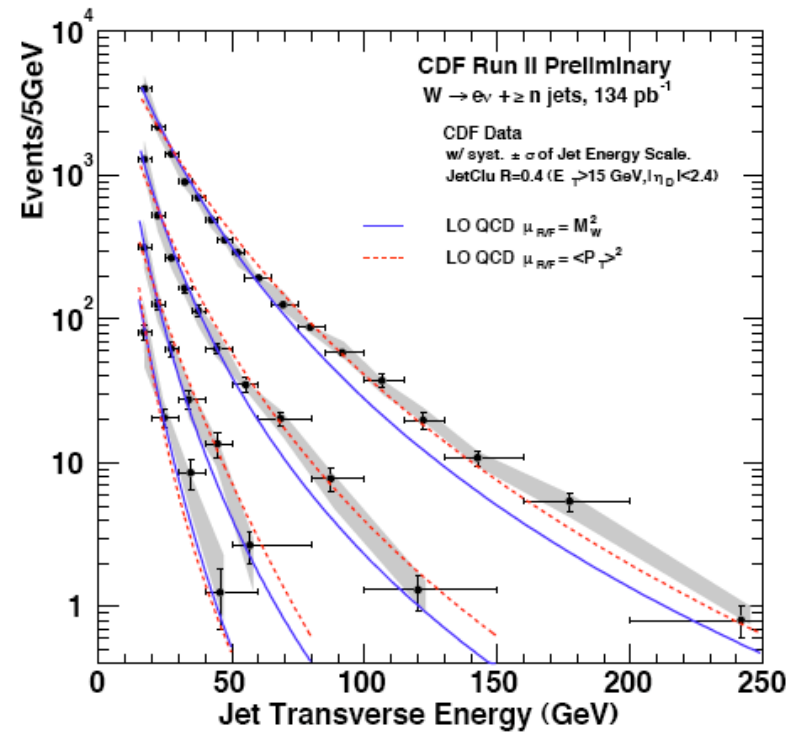
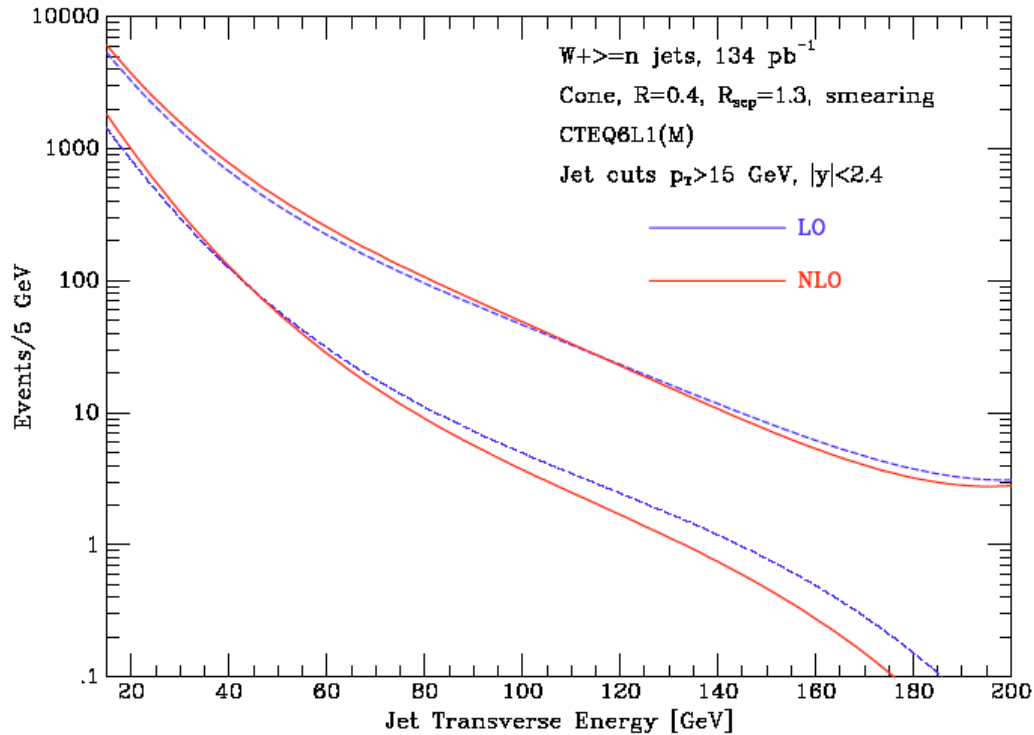


Differential cross section predictions



- NLO predictions for 1 and 2 jet E_T distributions

...and lots of other predictions to come: dijet mass, ΔR_{jj} ,..



Summary



- Still at an early stage both with data and with theory comparisons
- Even restricted to $W+\leq 2$ jets, perhaps we can learn something about CKKW and NLO corrections and apply this knowledge to higher jet multiplicities