Update results aMC@NLO

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Merged samples (0-, 1-, and 2-parton) with $\mu_Q = 30$, 50, and 70 GeV

Anti-k_T jets, $R = 0.4$, only those with $|\eta| \leq 5$ considered

▶ cuts$_1$:

at least two jets, both with $p_T \geq 25$ GeV

▶ cuts$_2$:

$M_{j_1 j_2} \geq 400$ GeV   && $|\Delta y_{j_1 j_2}| \geq 2.8$ &&   cuts$_1$

Normalization

	$\mu_Q = 30$	$\mu_Q = 50$	$\mu_Q = 70$
no cuts	13.91 (58.8+29+12.2)%	14.09 (77.5+18.7+3.8)%	14.08 (86.4+12+1.6)%
cuts$_1$	1.65 (0.2+14.6+85.2)%	1.62 (16.1+51+32.9)%	1.58 (36+49.8+14.2)%
cuts$_2$	0.125 (0.2+7.5+92.3)%	0.170 (21.8+43.5+34.7)%	0.207 (43.6+43.4+13)%

Inclusive total rate (without multi-jet merging): 13.4
(3.8% smaller than merging with muQ=30)

Inclusive total rate is consistent with POWHEG results that
Paolo sent earlier today.
What is the Sherpa result without merging?

Comparing with AlpGen

* In Alpgen, the total cross section of the merged result (with up to three partons) is equal to 8.922, i.e. more than 50% lower than our result

    * This factor is of course due to the large NLO corrections

    * So perhaps more interestingly are the scaling behaviors of the cross sections after applying the various cuts

* AlpGen results are obtained with merging up to 3 partons and showered with Herwig6 (and muQ=30 GeV, cone=0.375 and maximum rap=5; same as in the FxFx merging paper, as suggested by Michelangelo)

Comparing efficiency

Numbers computed from cross sections shown by Gavin in the Higgs WGXS meeting

	AlpGen (up to 3 partons)	aMC@NLO (muQ=30)	Sherpa	MiNLO	HEJ
cuts1/total	0.12563	0.11870	0.15657	0.13426	
cuts2/total	0.00897	0.00899	0.01480	0.01315	
cuts2/cuts1	0.07145	0.07575	0.09453	0.09790	0.05772
cuts2/cuts1 compared to AlpGen	---	+6.0%	+32.3%	+37.0%	-19.2%

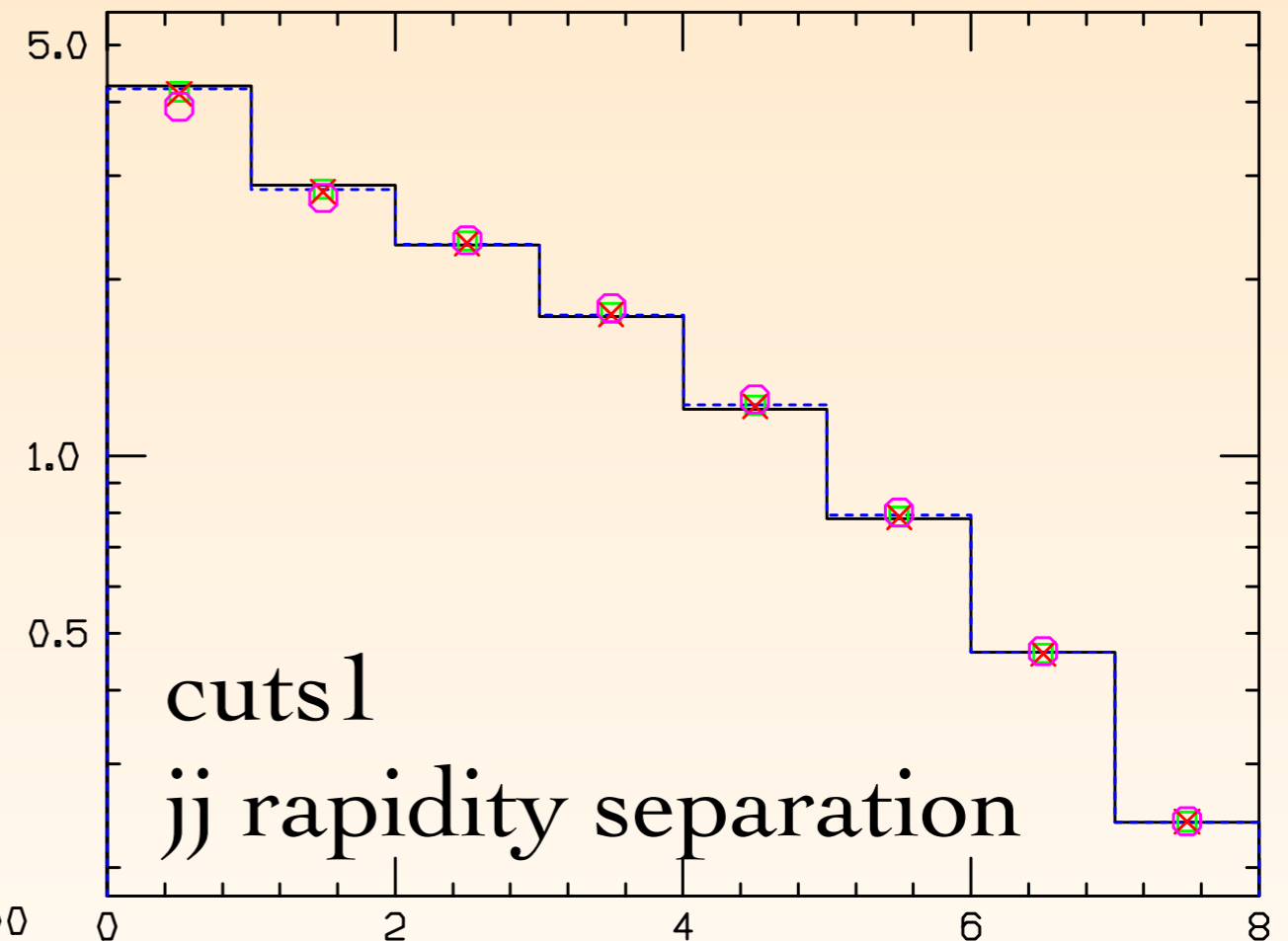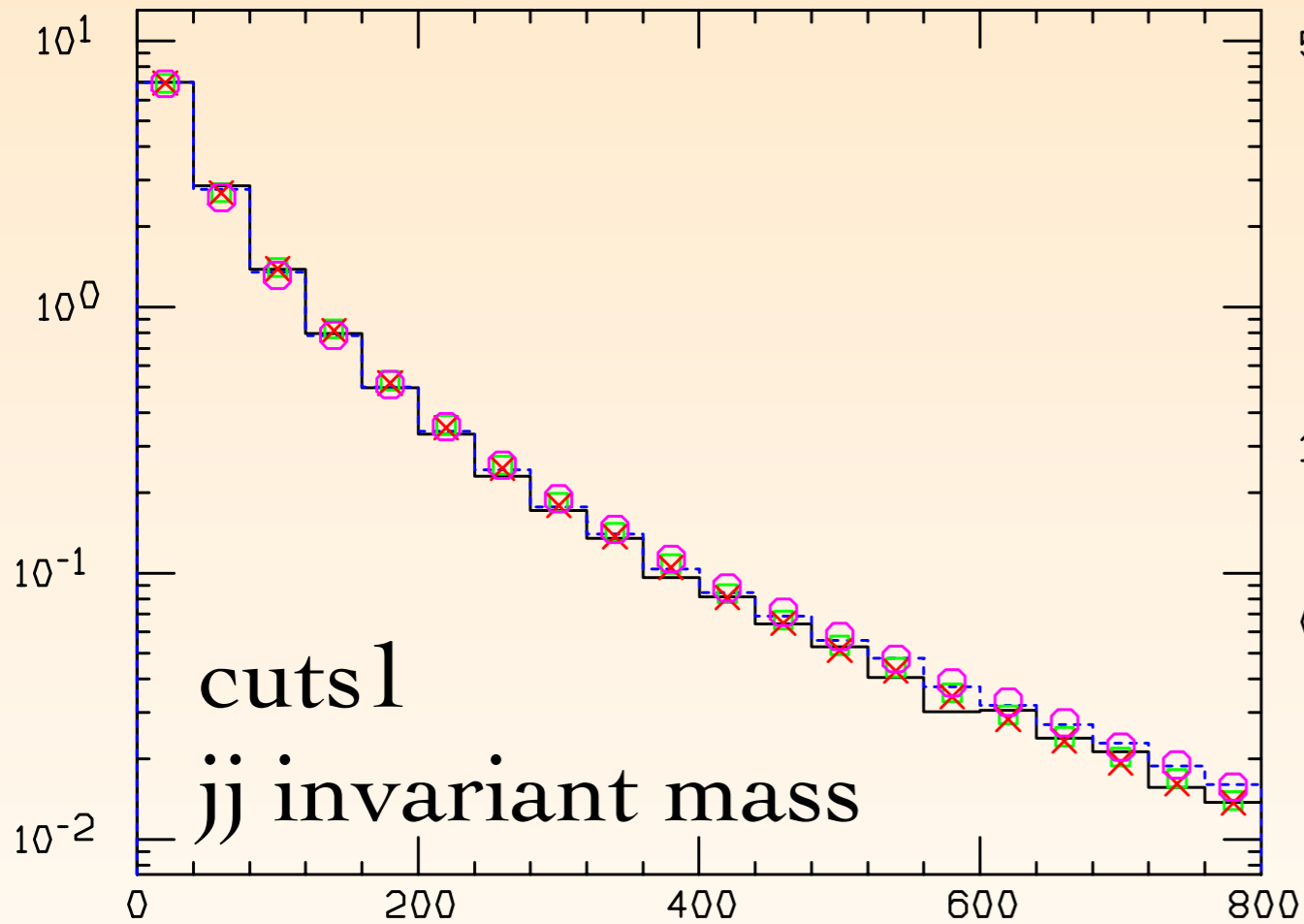Rikkert Frederix, CERN

Comparing with merging up to 1 parton

* Alpgen results on previous page are basically identical for merging with up to 2 partons only

* **If merging only up to 1 parton, results are vastly different;** however aMC@NLO and AlpGen are consistently different

* With FxFx merging, aMC@NLO samples behave rather inclusively: probably good news, because renders it easy to control contributions from the various samples

	AlpGen (up to 1 parton)	aMC@NLO (up to 1 NLO parton)
cuts1/total	0.10922	0.11723
cuts2/total	0.01288	0.01254
cuts2/cuts1	0.11795	0.10699

Alpgen vs. aMC@NLO

hist black solid: aMC@NLO (up to 2partons at NLO)
hist blue dashed: aMC@NLO (up to 1parton at NLO)

green boxes: Alpgen (up to 3partons)
red crosses: Alpgen (up to 2partons)
magenta circles: Alpgen (up to 1parton)

cuts1
jj invariant mass

cuts1
jj rapidity separation

* Consistent change in shape (in the invariant mass) when increasing the largest parton multiplicity

Comparing to results without merging

* We have also checked that the H+2j unmerged aMC@NLO results agrees rather well with the merged results with muQ=30 GeV.

* Small deviations are seen only for those observables for which the merged results with larger muQ's are very different from the muQ=30 ones (see Stefano's original talk). This is a consistency check, that ensures that there are no artifacts due to the FxFx merging.

Comments

* Results & plots with muQ=20 GeV are not yet finished

* We will run with higher statistics over the christmas break

* We plan to do more comparisons with Alpgen; there are some differences in some distributions.

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