Higgs Boson + Dijets

(Gluon Fusion Contribution)

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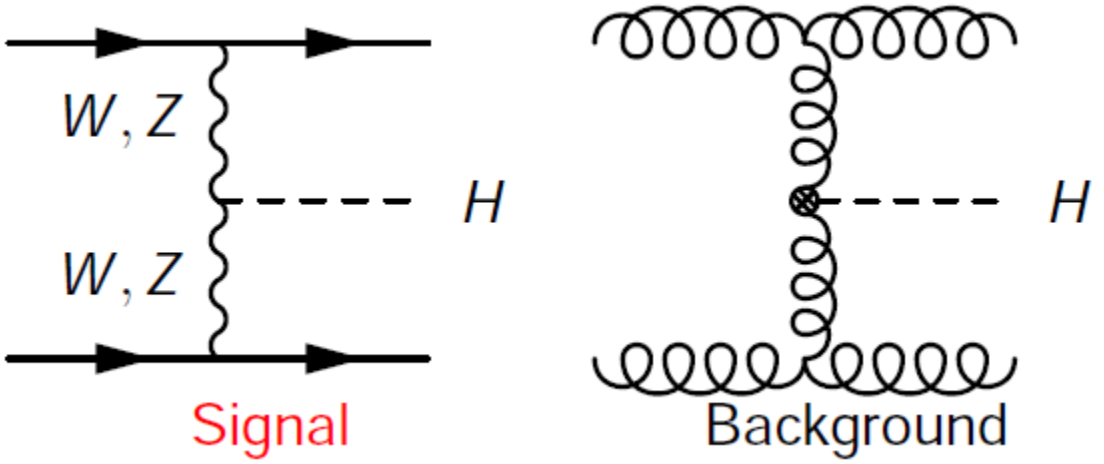
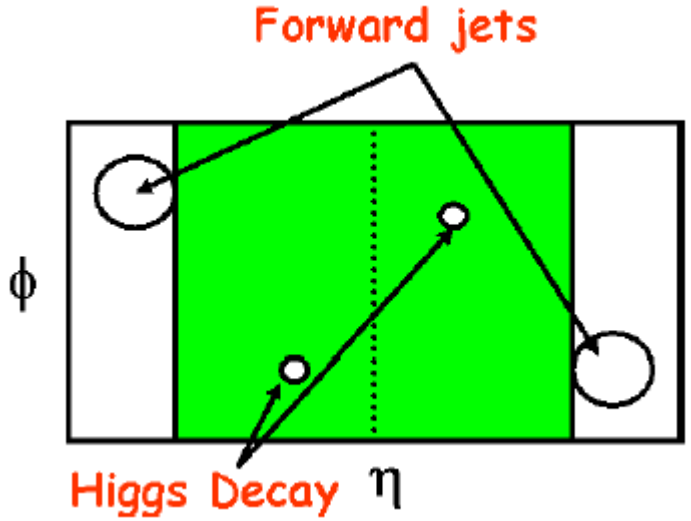
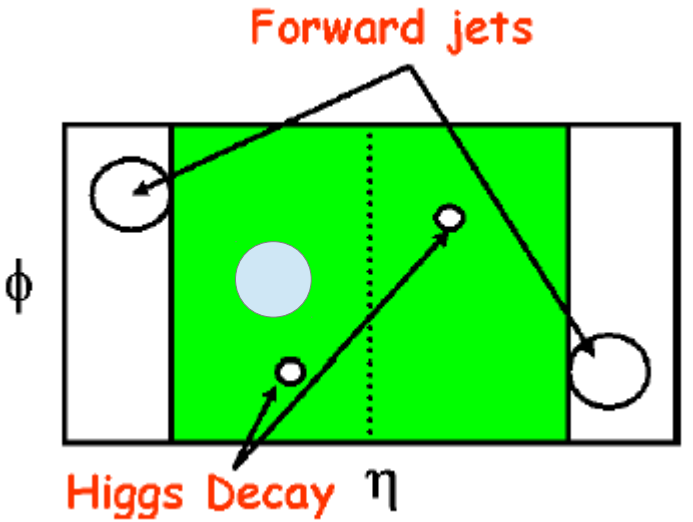
Les Houches 2013

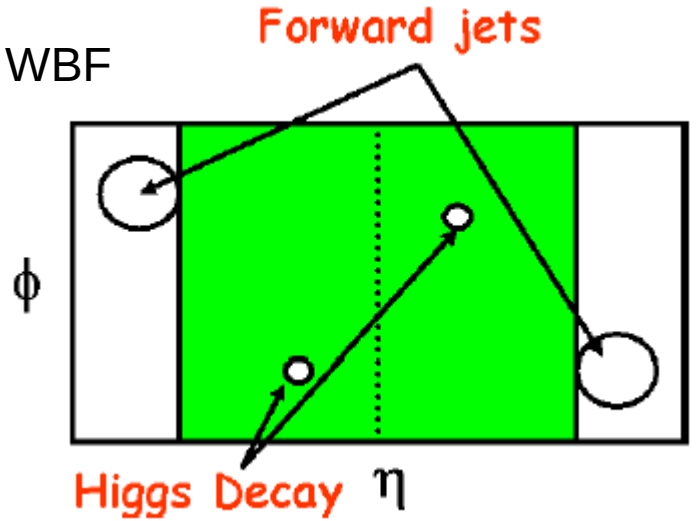
The Problem

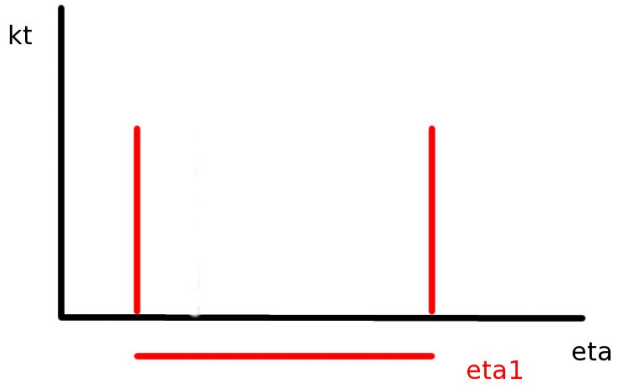

W, Z
H
W, Z
Signal
H
Background

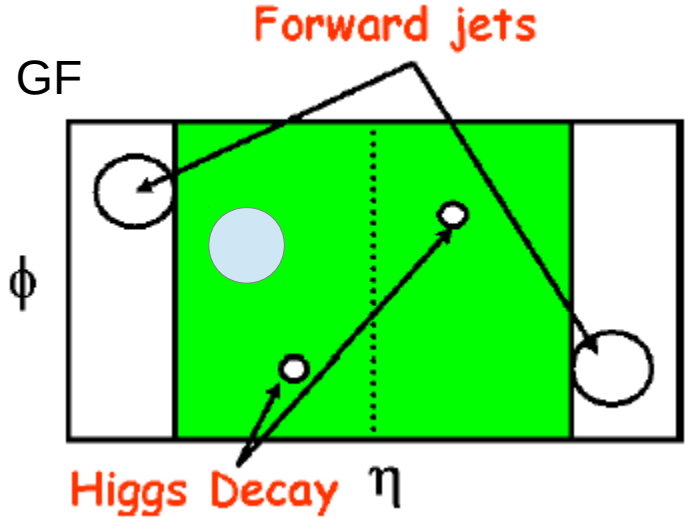

Forward jets
ϕ
Higgs Decay
η

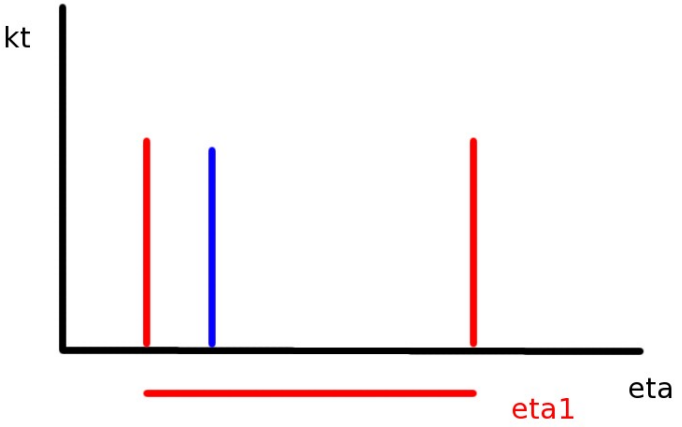

Forward jets
ϕ
Higgs Decay
η

Different Radiation Pattern

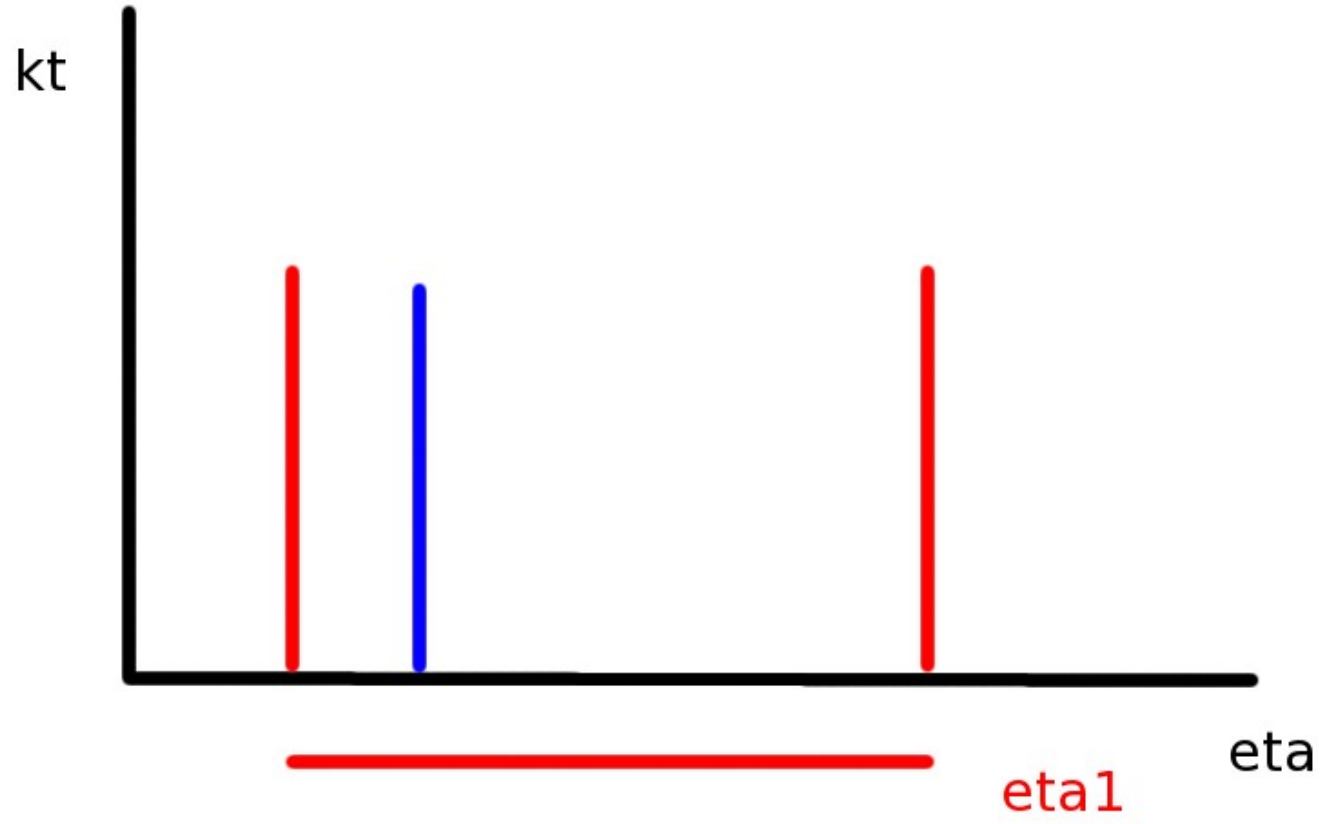






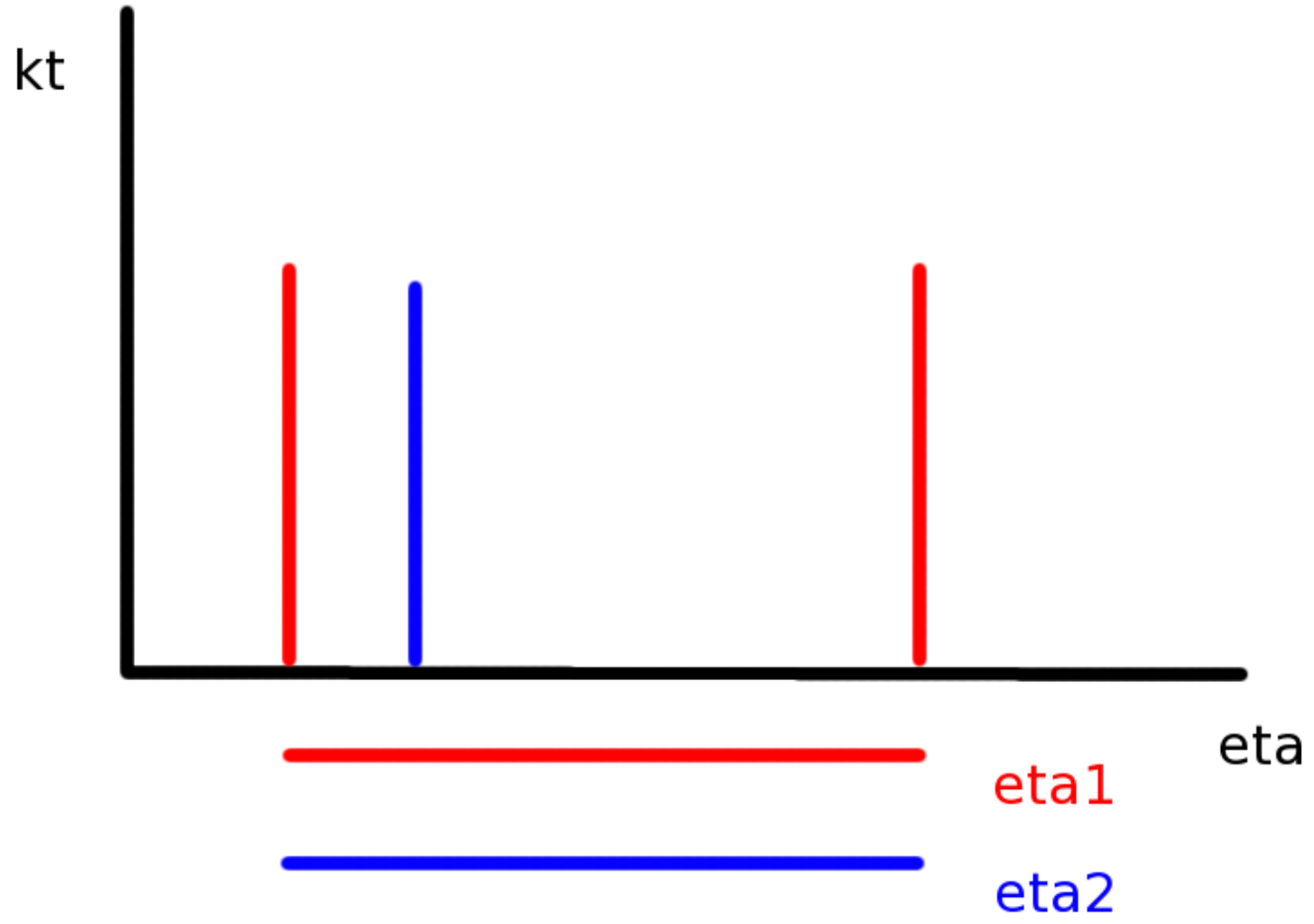


Many Jets Can Cause Problems



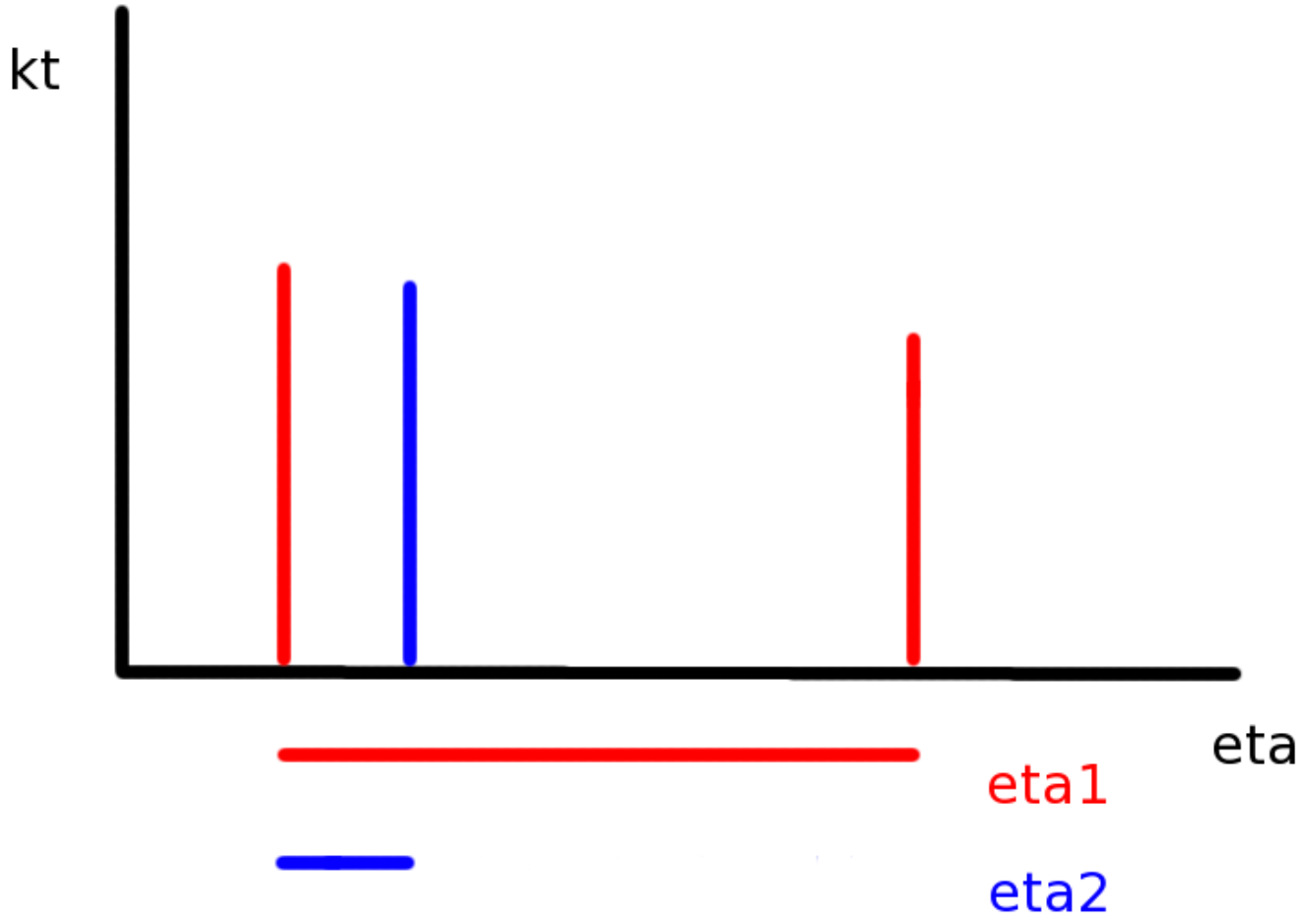
(Pseudo-)rapidity between forward/backward jets

Many Jets Can Cause Problems



(Pseudo-)rapidity between hardest jets

Many Jets Can Cause Problems

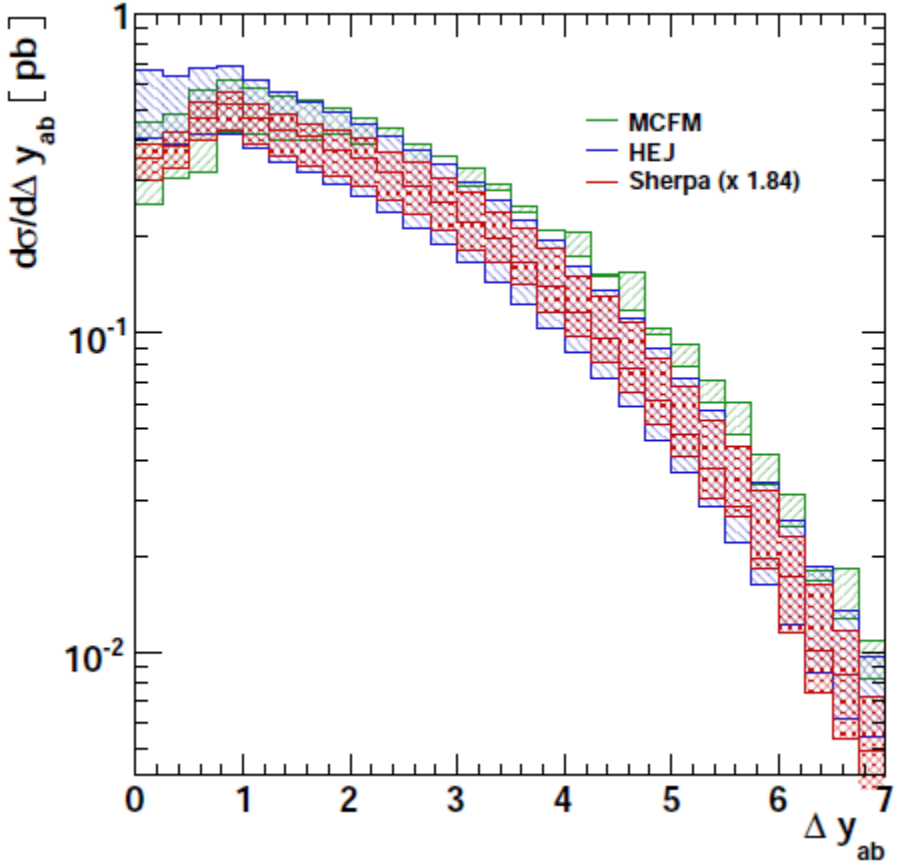


(Pseudo-)rapidity between hardest jets

Stability?

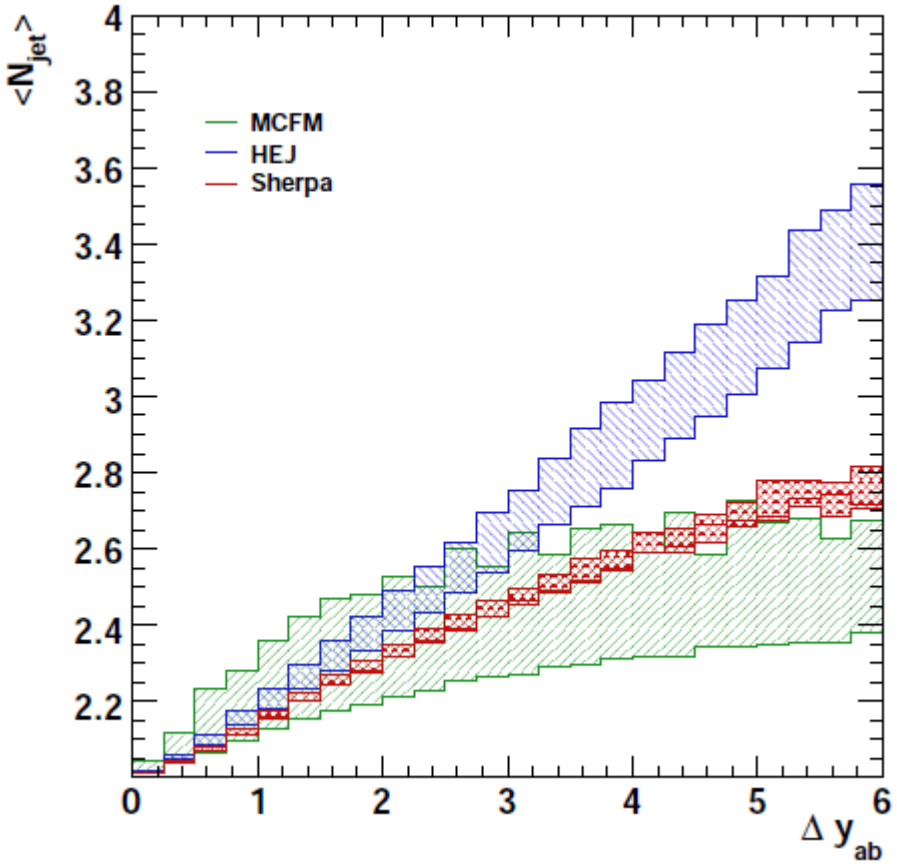
- Try dsigma/dDelta y_fb instead of dsigma/dDelta y_12, m_fb instead of m_12
- The description of the radiation pattern can be tested in W+dijets, Z+dijets, pure dijets, before applied in H+Dijets.
- When understood, GF Hjj can be used to extract CP properties of the gluon-Higgs coupling.

Results from LH 2007



http://arxiv.org/abs/arXiv:1003.1241

Results from LH 2007



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Addendum for FxFx-Merging

Rates (pb)

(and fractions of 0-, 1- and 2-parton sample contributions)

	$\mu_Q = 30$	$\mu_Q = 50$	$\mu_Q = 70$
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)%

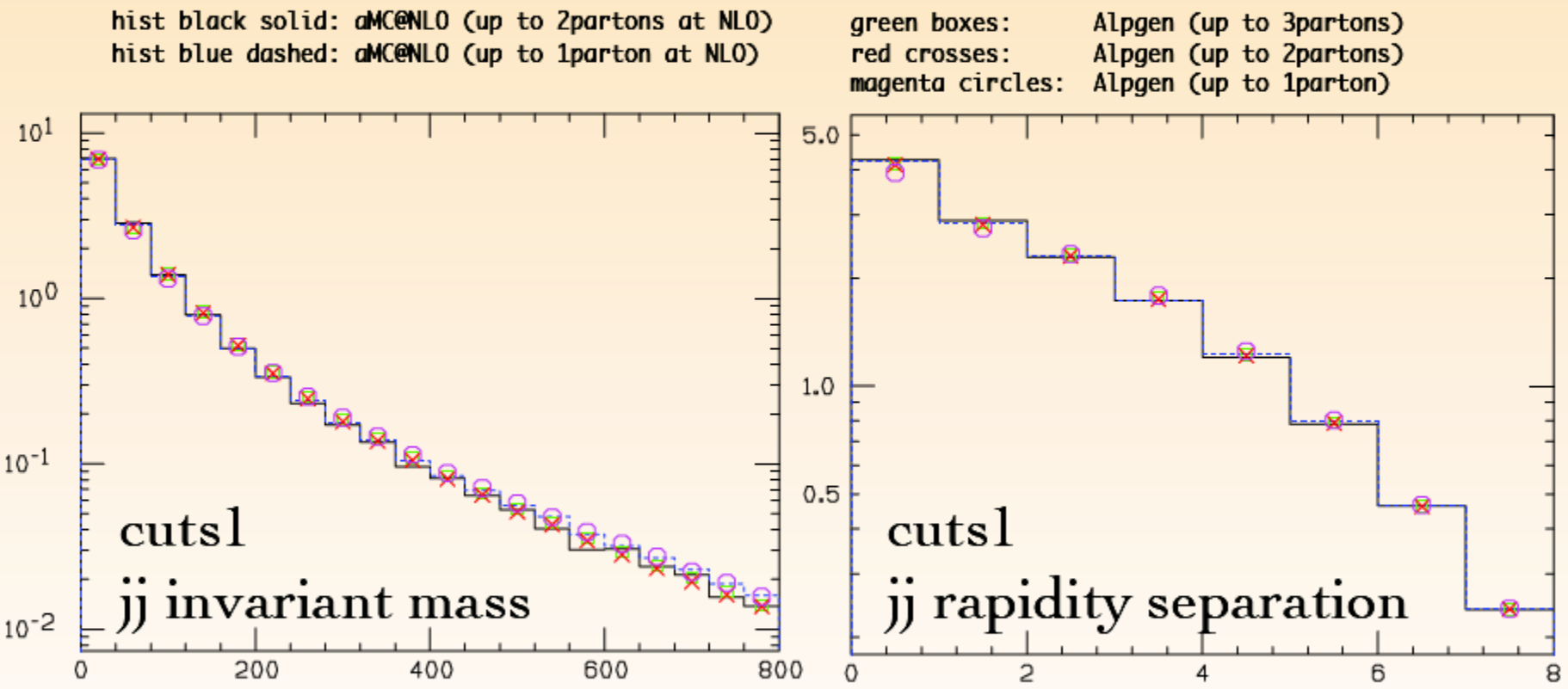
ME ⟵ ⟶ MC

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



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