Standardized Comparison of ME generators

Gervasio Gómez
Instituto de Física de Cantabria / CSIC

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Motivation

- Several ME generators available:
  - ALPGEN, MadGraph, GR@PPA, CompHEP, MCFM, others
  - Many processes including W/Z + light or heavy jet-partons
  - Define a common set of inputs, cuts and processes to make comparisons
- Useful
  - Authors get feedback from users
    - Improvements in code
      - Better user interfaces
      - Implementation of new processes
      - Good way to determine if there are bugs
  - Agreement ⇨ trust

"comparison" ME inputs

Parameter	value
M_z	91.188 GeV
M_w	80.41 GeV
G_F	1.16639×10^{-5} GeV^{-2}
$\sin^2\theta_w$	0.2224
α_{em}	1/132.43
Γ_w	2.047 GeV
Γ_z	2.445 GeV
g	0.6532
g'	0.7407
CKM: $V_{ud}=V_{cs}$	sqrt(0.95)
CKM: $V_{us}=-V_{cd}$	sqrt(0.05)
CKM: $V_{ub}=V_{cb}$	0.0
CKM: $V_{ts}=V_{td}$	0.0
CKM: V_{tb}	1.0

"comparison" ME inputs

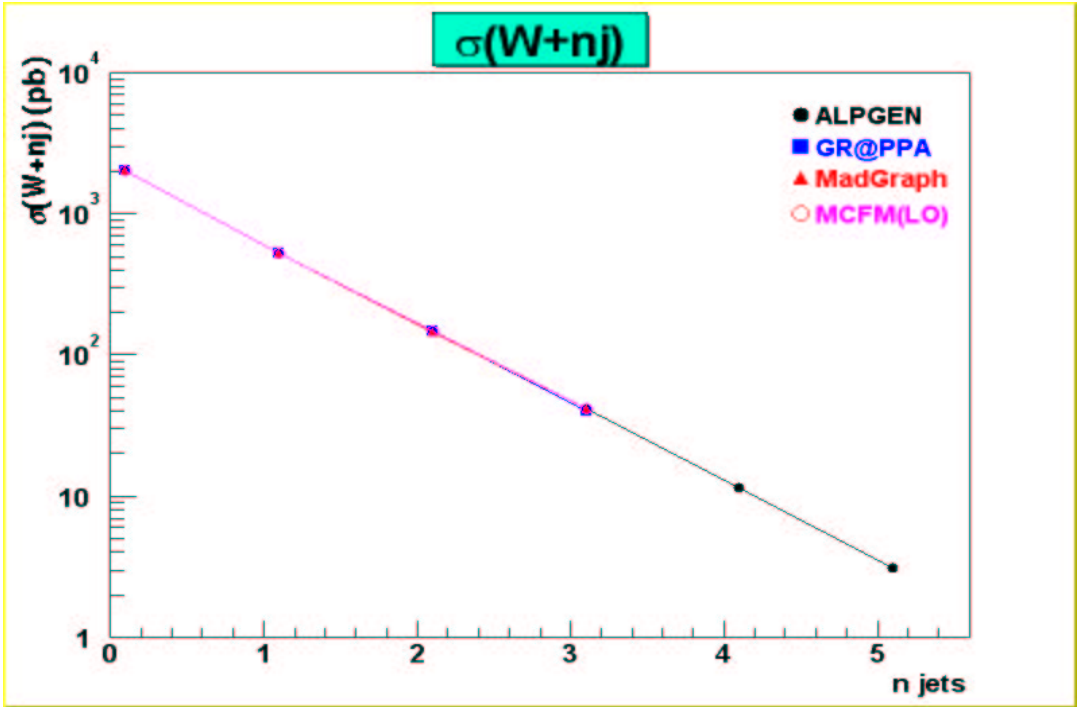
Parameter	value
beam	p-pbar
sqrt(s)	1.96 TeV
Q^2	M_V^2
PDF	CTEQ5L (parametric)
$\alpha_s(M_Z)$	0.127
m_t	175.0 GeV
m_b	4.75 GeV
m_c	1.55 GeV
m_τ	1.777 GeV

"comparison" cuts

- Charged leptons
  - Z/γ^* only, l^+l^- pairs: $50<m_{ll}<200$ GeV
  - No other cuts
- Neutrinos
  - No cuts
- Jet-partons
  - $P_T > 10$ GeV
  - $|\eta| < 2.5$
- Separation between particles/partons
  - jj: $\Delta R_{JJ} > 0.4$ (j=jet parton)
  - jl, ll: no cut in ΔR (l=any lepton)

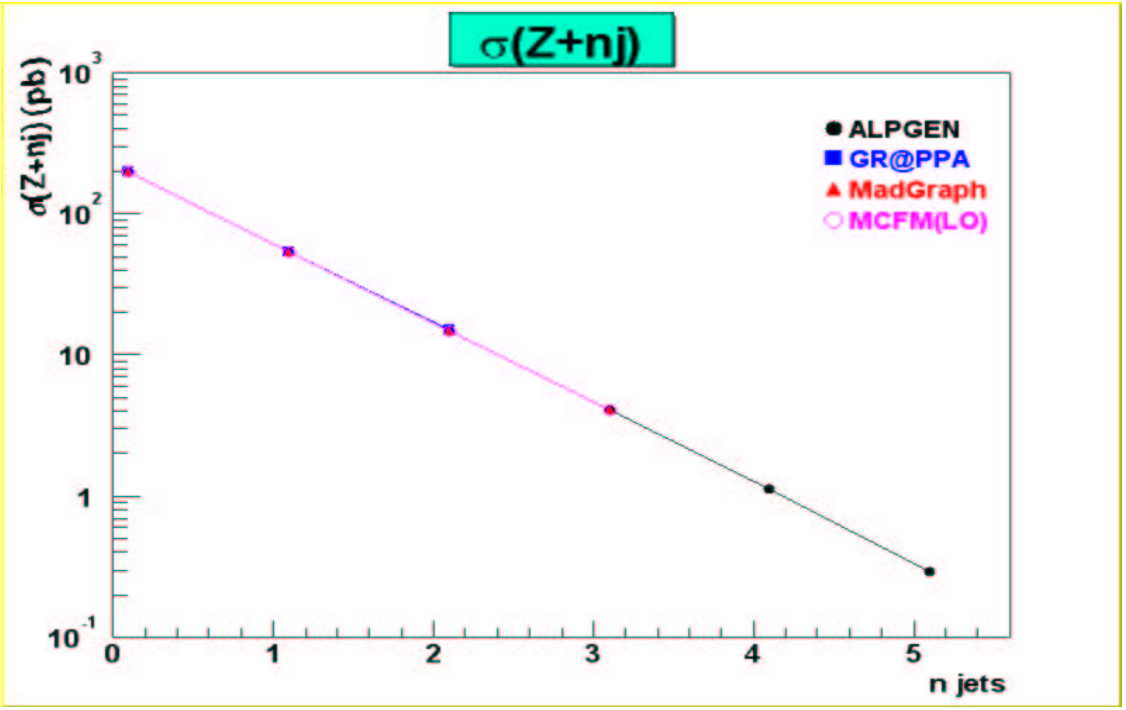
σ(W+jets) (pb)

ME-MC	W+0j	W+1j	W+2j	W+3j	W+4j	W+5j
ALPGEN	2046±1	522.6±0.6	146.1±0.3	41.5±0.2	11.55±0.07	3.13±0.02
GRAPPA	2042±4	525.4±0.6	146.8±0.3	40.2±0.3		
MadGraph	2044±5	525.4±1.1	146.1±0.3	41.8±0.1		
MCFM(LO)	2044±1	526.3±0.5	147.2±0.3	41.8±0.2		



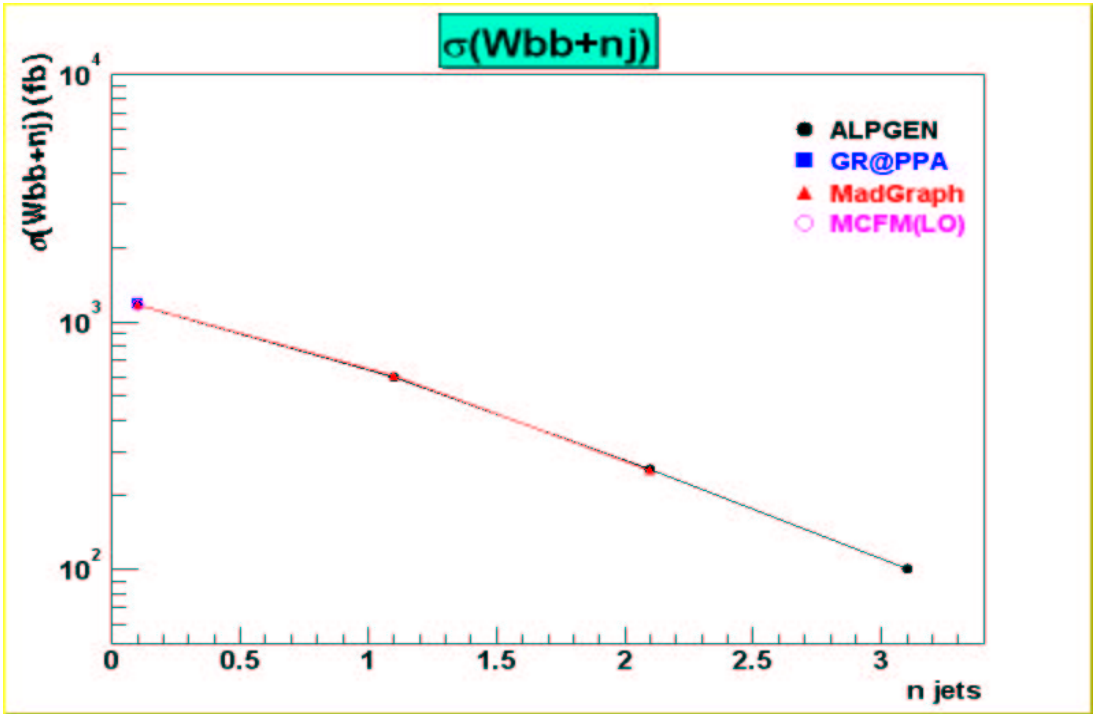
σ(Z+jets) (pb)

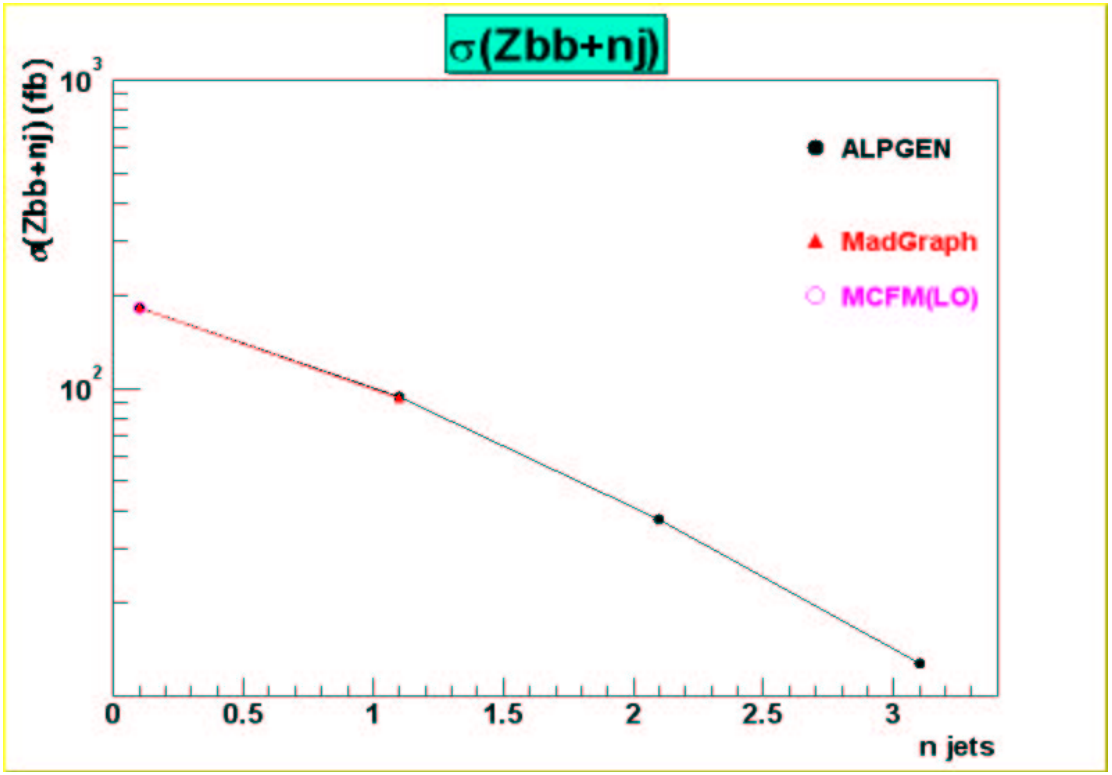
ME-MC	Z+0j	Z+1j	Z+2j	Z+3j	Z+4j	Z+5j
ALPGEN	198.0±0.2	53.72±0.06	14.76±0.05	4.09±0.02	1.13±0.01	0.292±0.002
GRAPPA	198.1±0.2	54.02±0.06	15.07±0.02			
MadGraph	198.9±0.7	53.5±0.2	14.70±0.04	4.079±0.009		
MCFM(LO)	198.2±0.1	53.80±0.05	14.79±0.03	4.11±0.02		



σ(Wbb+jets) (fb)

ME-MC	Wbb+0j	Wbb+1j	Wbb+2j	Wbb+3j
ALPGEN	1170±2	596±2	253±2	100±1
GRAPPA	1178±3			
MadGraph	1175±8	602±2	251.1±0.7	
MCFM(LO)	1175±3			



σ(Zbb+jets) (fb)

ME-MC	Zbb+0j	Zbb+1j	Zbb+2j	Zbb+3j
ALPGEN	181.7±0.4	93.5±0.5	37.6±0.4	12.8±0.6
MadGraph	182.5±1.2	92.7±0.4		
MCFM(LO)	182.2±0.5