

In the following table I show which is the sensitivity to the generator cuts at different reconstruction level. The process I'm focusing on is W+3jets (light jets) with the W decaying into electron and neutrino generated with Alpgen. The cuts I used are:

- $Q^2 = M_W^2$
- Collision type: proton-anti-proton at 980 GeV
- Number of weighted events: 5×10^7
- Lepton: $P_T \geq 8$ GeV; $|\eta| \leq 10$; $\Delta R_{ej} \geq 10$; Miss $E_T \geq 0$

I changed the jet cuts at the generator level for each of the nine samples as following:

- Jets: $P_T \geq 8$ GeV; $|\eta| \leq 2.5$; $\Delta R_{ij} \geq 0.2$, i,j=1,3
- Jets: $P_T \geq 10$ GeV; $|\eta| \leq 2.5$; $\Delta R_{ij} \geq 0.3$, i,j=1,3
- Jets: $P_T \geq 12$ GeV; $|\eta| \leq 2.5$; $\Delta R_{ij} \geq 0.4$, i,j=1,3
- Jets: $P_T \geq 8$ GeV; $|\eta| \leq 2.5$; $\Delta R_{ij} \geq 0.2$, i,j=1,3
- Jets: $P_T \geq 10$ GeV; $|\eta| \leq 2.5$; $\Delta R_{ij} \geq 0.3$, i,j=1,3
- Jets: $P_T \geq 12$ GeV; $|\eta| \leq 2.5$; $\Delta R_{ij} \geq 0.4$, i,j=1,3
- Jets: $P_T \geq 8$ GeV; $|\eta| \leq 2.5$; $\Delta R_{ij} \geq 0.2$, i,j=1,3
- Jets: $P_T \geq 10$ GeV; $|\eta| \leq 2.5$; $\Delta R_{ij} \geq 0.3$, i,j=1,3
- Jets: $P_T \geq 12$ GeV; $|\eta| \leq 2.5$; $\Delta R_{ij} \geq 0.4$, i,j=1,3

The reconstruction level cuts are:

- Reconstruction level cuts: $P_T \geq 15$ GeV; $|\eta| \leq 2$; $R_{iet} = 0.4$

nothing is require for the leptons. The table is organize in nine sectors one for each set of jet cuts. The first line in each sector is the cross section given by Alpgen; the second line is the cross section at the parton level evaluated with the Reconstruction cuts; the third line is the cross section at the jet

	W3j	$\Delta R_{min} = 0.2$	$\Delta R_{min} = 0.3$	$\Delta R_{min} = 0.4$
$P_T > 8$ Gev	$\sigma(pb)$ generator lev.	72.82 ± 0.29	62.31 ± 0.19	55.33 ± 0.15
	$\sigma(pb)$ parton lev.	13.26	13.47	13.39
	$\sigma(pb)$ jet lev.	10.98	9.94	9.10
	$\sigma(pb)$ jet match	4.93	5.04	4.42
$P_T > 10$ Gev	$\sigma(pb)$ generator lev.	44.97 ± 0.11	39.16 ± 0.09	34.88 ± 0.10
	$\sigma(pb)$ parton lev.	13.61	13.30	13.66
	$\sigma(pb)$ jet lev.	9.40	8.54	7.73
	$\sigma(pb)$ jet match	5.01	4.67	4.32
$P_T > 12$ Gev	$\sigma(pb)$ generator lev.	29.88 ± 0.08	25.98 ± 0.08	23.16 ± 0.04
	$\sigma(pb)$ parton lev.	13.89	13.50	13.22
	$\sigma(pb)$ jet lev.	8.22	7.25	6.65
	$\sigma(pb)$ jet match	4.77	4.43	4.14

level requiring three and only three jet passing the reconstruction cuts; the last line is the cross section at the jet level with all the three jets matched to a parton. A jet is defined matched if there is one and only one parton inside the jet, i.e. the distance $\Delta R_{part-jet} = \sqrt{(\Delta\eta)^2 + (\Delta\phi)^2} \leq R_{jet}$. There is no energy matching required. The large difference between the cross section at the parton level evaluated within the Reconstruction cuts and the cross section for three jets matched seems to be related to some energy loss at the jet level. The jet energy is in fact systematically below the correspondent parton energy, it means that some events contribute to the parton level cross section but, even if they are matched, are rejected at the matched level because the jet is too soft. This effect can be reduced increasing the jet cone. The sensitivity to the generator level cuts at the jet level without any matching is around 40%, requiring the matching the sensitivity is between 10% and 20%.