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JET ENERGY SCALE SETTING WITH «$\gamma+Jet$» EVENTS AT LHC ENERGIES. MINIJETS AND CLUSTER SUPPRESSION AND $P_t^{\gamma}-P_t^{Jet}$ DISBALANCE

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1. INTRODUCTION

In this article we continue our study of the $pp \to \gamma + Jet + X$ process caused by two partonic subprocesses:

$$qg \to q + \gamma \qquad (1a)$$

$$q\overline{q} \to g + \gamma \qquad (1b)$$

The main goal of this paper is to estimate whether there will be a sufficient number of "$\gamma + Jet$" events for setting the mass scale of a jet with a good accuracy and for performing hadron calorimeter (HCAL) calibration at LHC energies. We use the PYTHIA generator as a model for this sort of estimation supposing that the results with other physical event generators like HERWIG, and with GEANT–based simulation packages will be discussed in our further publications.

Here we study in detail the sources of $P_t{}^{\gamma}$ and $P_t{}^{Jet}$ disbalance and the impact of the P_{tCUT}^{clust} parameter [1, 2], imposed as the cut on possible minijets or clusters P_t for the calibration accuracy improvement[1].

2. DETAILED "$\gamma + Jet$" SYSTEM P_t DISBALANCE DEPENDENCE ON P_{tCUT}^{clust} PARAMETER.

In the previous papers ([1, 2]) we introduced physical observables (variables) for studying "$\gamma + Jet$" events [1] and discussed what cuts for them could lead to a decrease in the $P_t{}^{\gamma}$ and $P_t{}^{Jet}$ disbalance [2]. The calibration procedure depends on the gained statistics. One can make these cuts to be tighter if more events would be collected during data taking.

In the tables of Appendices 1–4 for four different $P_t{}^{\gamma}$ intervals the mean values of the most important variables that reflect the main features of "$\gamma + Jet$" events and the other values that characterize $P_t{}^{\gamma}$ and $P_t{}^{Jet}$ balance (as predicted by the PYTHIA model), are presented.

Appendix 1 contains tables for $P_t{}^{\gamma}$ varying from 40 to 50 GeV/c. In these tables we present the values of interest for three different Selections, mentioned in Section 3.2 [1]. Each page corresponds to a definite value of $\Delta\phi$ (which enters the formula (23) of [1]) as a measure of deviation from the absolute back-to-back orientation of two $\vec{P_t}{}^{\gamma}$ and $\vec{P_t}{}^{Jet}$ vectors. So, Tables 1 and 2 on the first page and Tables 3 and 4 on the second one in each of Appendices 1–4 correspond to $\Delta\phi = 180°$ (i.e. to the case of no restriction on the back-to-backness angle choice) and to $\Delta\phi = 15°$, respectively. On the third page of each of Appendices 1–4 we present the Tables 5 and 6 (for the same cut $\Delta\phi = 15°$) that correspond to the Selection 2 case described in [1]. This Selection differs from Selection 1, presented in Tables 1–4, by addition of the cut (26) of [1]. It allows one to select events with the "isolated jet", i.e. events having the total P_t activity in $\Delta R = 0.3$ ring around a jet not exceeding 2% of jet P_t. Tables 7, 8, shown on the fourth page in each of Appendices, present results found in the case of Selection 3 for the same cut $\Delta\phi = 15°$. The last sample includes only events having the same jet found simultaneously by both jetfinders UA1 and LUCELL.

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[1] The detailed information on the dependence of the $P_t{}^{\gamma}$ and $P_t{}^{Jet}$ disbalance on P_{tCUT}^{clust} and P_{tCUT}^{out} in the case of background events can be found in [3, 4].

The columns in Tables 1–6 correspond to five different values of $Pt_{CUT}^{clust} = 30,\ 20,\ 15,\ 10$ and $5\ GeV/c$. The upper lines of Tables 1–6 from all the Appendices contain the numbers of events N_{event} expected for "HB events", i.e. for "$\gamma + Jet$" events in which jet is completely fitted into the barrel region of HCAL (see [2]) for the integrated luminosity $L_{int} = 3\ fb^{-1}$ for different values of P_{tCUT}^{clust} and a fixed value of $\Delta\phi$. The last lines of the Tables present the number of generated events, left after cuts, i.e. entries. In the next four lines of the Tables we put the values of P_t56, $\Delta\phi$, ${P_t}^{out}$, ${P_t}^{\eta>5}$ defined by formulae (3), (23), (25) and (5) of [1], respectively, and averaged over the events selected with a chosen P_{tCUT}^{clust} value.

From the Tables we see that the values of P_t56, $\Delta\phi$, ${P_t}^{out}$ decrease fast with decreasing P_{tCUT}^{clust}, while the averaged values of ${P_t}^{\eta>5}$ show very weak dependence on it (practically constant).

In the sixth line the average values of the initial state vector disbalance ${P_t}^{5+6}$ (defined by (3) of [1]) are presented in addition to the rough scalar P_t56 estimator value. It is seen that they are smaller than P_t56 value.

The next lines represent the average values of the variables ${P_t}^{\gamma+part}$, ${P_t}^{\gamma+jet}$, ${P_t}^{\gamma+Jet}$, that are defined as averaged values of (2), (12) and (4) from [1] and serve as a measure of the P_t disbalance in the "$\gamma + Jet$" system. These lines correspond in the following order to: the balance at the parton level, the balance of that part of the "$\gamma + Jet$" system which can be measured by calorimeters, i.e. defined by ${P_t}^{jet}$ (see (10) of [1]), and the balance of the "$\gamma +$ complete jet" system. Practically all the values of these three variables drop approximately by a factor of two when we move from ${P_t}^{clust} = 30\ GeV/c$ to ${P_t}^{clust} = 5\ GeV/c$ for all ${P_t}^{\gamma}$ intervals and for both the UA1 and LUCELL algorithms.

To take into account the part of jet P_t carried off by neutrinos, we have introduced in [1] the correction Δ_ν that should be added to ${P_t}^{jet}$ to restore P_t of the complete jet in each event:

$$\Delta_\nu = {P_t}^{Jet} - {P_t}^{jet} \tag{2}$$

Let us define a new quantity ${P_t}^{J}$, which would serve as an estimator for the total ${P_t}^{Jet}$ value, by the sum of ${P_t}^{jet}$ (a measurable part of ${P_t}^{Jet}$) and an averaged Δ_ν correction:

$${P_t}^{J} = {P_t}^{jet} + <\Delta_\nu> \tag{3}$$

The comparison of the ${P_t}^{\gamma+part}$ and ${P_t}^{\gamma+Jet}$ shows that the fragmentation process contribution into the value of the final state P_t disbalance is much more smaller than the contribution of ISR that defines a dominant part of P_t disbalance in the "$\gamma + Jet$" system. The photon and the jet P_t disbalance is defined in fact by the disbalance appearing at the parton level of fundamental $2 \to 2$ subprocesses (1a) and (1b). The comparison of ${P_t}^{\gamma+Jet}$ and ${P_t}^{5+6}$ shows that the final state disbalance has, approximately, the value of the initial state P_t disbalance of colliding partons.

After the described lines follow three lines below for the averaged values of the $({P_t}^{\gamma} - {P_t}^{J})/{P_t}^{\gamma}$, $(1 - cos(\Delta\phi))$ and $P_t(O{+}\eta > 5)/{P_t}^{\gamma}$ quantities that enter equation (29) of [1] which has the meaning of the scalar variant of vector equation (16) of [1] for the total transverse momentum conservation in a physical event. The first quantity characterizes relative P_t disbalance in the "$\gamma +$ complete Jet" system. The second and the third ones have the meaning of the averaged values of two terms in the right-hand part of balance equation

(29) of paper [1]. The value of $\langle(1 - cos(\Delta\phi))\rangle$ is smaller than $\langle P_t(O\!+\!\eta > 5)/P_t{}^{\gamma}\rangle$ for the cut $\Delta\phi \leq 15^\circ$ and tends to decrease more with a growth of the energy. So, we conclude that the main source of the P_t disbalance in "$\gamma + Jet$" system is defined by the term $(P_t(O\!+\!\eta > 5)/P_t{}^{\gamma})$.

We see from the Tables that more restrictive cuts on the $P_t{}^{clust}$ observable lead to decreasing in the P_t56 and $P_t{}^{5+6}$ variables (non-observable ones) that serve, according to (3) of paper [1], as measures of the initial state radiation transverse momentum $P_t{}^{ISR}$, i.e. of the main source of the P_t disbalance in fundamental $2 \to 2$ subprocesses (1a) and (1b).

Thus, the variation of P_{tCUT}^{clust} from 30 GeV/c to 5 GeV/c for $\Delta\phi \leq 15^\circ$ leads to suppression of the P_t56 and $P_t{}^{5+6}$ values (or $P_t{}^{ISR}$) approximately by 25% for $40 < P_t{}^{\gamma} < 50\ GeV/c$ and by $\approx 40 - 45\%$ for $P_t{}^{\gamma} \geq 100\ GeV/c$. This diminishing of P_{tCUT}^{clust} value leads to diminishing of $(P_t{}^{\gamma} - P_t{}^{J})/P_t{}^{\gamma}$ ratio, i.e. we improve the calibration accuracy. For instance, in the case of $100 < P_t{}^{\gamma} < 120\ GeV/c$ the mean value of $(P_t{}^{\gamma} - P_t{}^{J})/P_t{}^{\gamma}$ drops from 4–5% to 0.6–1% (see Table 3 and 4 of Appendix 2) and in the case of $200 < P_t{}^{\gamma} < 240\ GeV/c$ the mean value of this variable drops from 2% to less than 0.5% (see Tables 3 and 4 of Appendix 3).

After requirement the jet to be isolated (see Tables 5, 8 of Appendix 1–4) we observe, starting from $P_t{}^{\gamma} = 100\ GeV/c$, that the mean values of $(P_t{}^{\gamma} - P_t{}^{J})/P_t{}^{\gamma}$ are contained inside the 1% window for any $P_t{}^{clust}$ value. In the case of $40 < P_t{}^{\gamma} < 50\ GeV/c$ interval, where we have enough events even after passing to Selections 2 and 3, we see that P_{tCUT}^{clust} works most effectively. Thus, $P_{tCUT}^{clust} = 10\ GeV/c$ allows to reduce $(P_t{}^{\gamma} - P_t{}^{J})/P_t{}^{\gamma}$ value to be less than 1.5% in the case of Selection 3 while a more strict cut $P_{tCUT}^{clust} = 5\ GeV/c$ makes it less than 0.5%. Both cuts leave quite a sufficient number of events: about 124 and 35 thousand, correspondingly (see Tables 7, 8 of Appendix 1).

In the following papers [3, 4] we shall show how these results can be improved by imposing the cut on $P_t{}^{out}$ as it enter the expression $P_t(O\!+\!\eta > 5)/P_t{}^{\gamma}$, which gives a dominant contribution to the right-hand side of P_t-balance equation (29) of [1] as we have mentioned above.

3. SUMMARY

The efficiency of the $P_t{}^{clust}$ restriction for the initial state radiation (ISR) suppression and the P_t balance improvement in the "$\gamma + Jet$" system was demonstrated. For the case of $\Delta\phi \leq 15^\circ$ such a strict limitation as $P_{tCUT}^{clust} = 5\ GeV/c$ would allow to reduce $P_t{}^{ISR}$ by 25 – 40% (in dependence on $P_t{}^{\gamma}$) and simultaneously to obtain the 1% disbalance value.

It is also shown that the number of the events (at $L_{int} = 3 fb^{-1}$), collected by Selection 2 criteria are not small even at $P_{tCUT}^{clust} = 5 - 10\ GeV/c$. These events have a topologically clean jet, whose transverse momentum is good balanced with one of the direct photon.

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Appendix 1

$$40 < P_t^{\gamma} < 50\ GeV/c$$

Table 1: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^{\circ} \pm 180^{\circ}$. UA1 algorithm.

Pt_{CUT}^{clust}	30	20	15	10	5
Nevent[*]	2829803	2319650	1904754	1283404	296186
$Pt56$	16.8	14.0	12.1	10.0	7.6
$\Delta\phi$	13.6	10.3	8.6	6.8	5.0
Pt^{out}	13.6	11.1	9.7	8.0	5.8
$Pt^{\eta>5}$	4.6	4.6	4.5	4.5	4.3
Pt^{5+6}	14.0	11.4	9.7	7.9	6.0
$Pt^{\gamma+part}$	13.9	11.3	9.7	7.9	6.0
$Pt^{\gamma+jet}$	13.3	10.8	9.4	7.8	6.0
$Pt^{\gamma+Jet}$	13.2	10.8	9.3	7.8	6.0
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0410	0.0432	0.0413	0.0351	0.0220
$1-cos(\Delta\phi)$	0.0546	0.0309	0.0209	0.0133	0.0083
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	-0.0135	0.0124	0.0205	0.0218	0.0138
Entries	83981	68841	56528	38088	8790

Table 2: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^{\circ} \pm 180^{\circ}$. LUCELL algorithm.

Pt_{CUT}^{clust}	30	20	15	10	5
Nevent	2739600	2208386	1781966	1145083	267241
$Pt56$	16.7	13.7	11.7	9.4	7.0
$\Delta\phi$	13.4	10.0	8.1	6.2	4.5
Pt^{out}	13.4	10.8	9.3	7.5	5.3
$Pt^{\eta>5}$	4.6	4.6	4.5	4.4	4.2
Pt^{5+6}	13.9	11.2	9.4	7.5	5.4
$Pt^{\gamma+part}$	13.8	11.1	9.3	7.4	5.4
$Pt^{\gamma+jet}$	13.1	10.5	9.0	7.2	5.4
$Pt^{\gamma+Jet}$	13.1	10.5	8.9	7.2	5.4
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0365	0.0380	0.0348	0.0282	0.0169
$1-cos(\Delta\phi)$	0.0525	0.0281	0.0182	0.0106	0.0056
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	-0.0160	0.0100	0.0166	0.0177	0.0113
Entries	81304	65539	52884	33983	7931

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[*] Number of events (Nevent) is given in this and in the following tables for integrated luminosity $L_{int} = 3\ fb^{-1}$

Table 3: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1904888	1771992	1583397	1160010	283752
$Pt56$	12.2	11.3	10.4	9.0	7.0
$\Delta\phi$	5.9	5.8	5.7	5.2	4.2
Pt^{out}	9.0	8.6	8.1	7.2	5.5
$Pt^{\eta>5}$	4.5	4.4	4.4	4.3	4.1
Pt^{5+6}	9.3	8.7	8.0	6.9	5.4
$Pt^{\gamma+part}$	9.3	8.6	7.9	6.9	5.4
$Pt^{\gamma+jet}$	8.3	7.9	7.5	6.7	5.4
$Pt^{\gamma+Jet}$	8.3	7.9	7.5	6.7	5.4
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0293	0.0342	0.0356	0.0324	0.0213
$1-cos(\Delta\phi)$	0.0080	0.0077	0.0073	0.0063	0.0044
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	0.0214	0.0266	0.0283	0.0261	0.0170
Entries	56532	52588	46991	34426	8421

Table 4: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1850638	1709150	1507481	1059900	260259
$Pt56$	12.2	11.2	10.3	8.8	6.7
$\Delta\phi$	6.0	5.8	5.6	5.1	4.1
Pt^{out}	8.9	8.4	7.9	7.0	5.3
$Pt^{\eta>5}$	4.5	4.4	4.4	4.3	4.0
Pt^{5+6}	9.4	8.7	7.9	6.8	5.2
$Pt^{\gamma+part}$	9.3	8.6	7.9	6.8	5.2
$Pt^{\gamma+jet}$	8.3	7.8	7.4	6.5	5.2
$Pt^{\gamma+Jet}$	8.2	7.8	7.3	6.5	5.1
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0236	0.0287	0.0290	0.0257	0.0163
$1-cos(\Delta\phi)$	0.0080	0.0077	0.0073	0.0062	0.0042
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	0.0156	0.0210	0.0218	0.0196	0.0122
Entries	54922	50723	44738	31455	7751

Table 5: Selection 2. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	222459	208947	190853	150148	52363
$Pt56$	11.4	10.4	9.6	8.4	6.7
$\Delta\phi$	5.6	5.5	5.4	4.9	4.1
Pt^{out}	8.9	8.2	7.7	6.8	5.3
$Pt^{\eta>5}$	4.5	4.4	4.4	4.4	4.2
Pt^{5+6}	8.6	7.9	7.3	6.4	5.1
$Pt^{\gamma+part}$	8.7	8.0	7.4	6.5	5.2
$Pt^{\gamma+jet}$	8.3	7.6	7.1	6.4	5.3
$Pt^{\gamma+Jet}$	8.3	7.7	7.2	6.4	5.3
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	-0.0469	-0.0336	-0.0252	-0.0187	-0.0137
$1-cos(\Delta\phi)$	0.0073	0.0070	0.0067	0.0059	0.0041
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0540	-0.0405	-0.0318	-0.0245	-0.0178
Entries	6602	6201	5664	4456	1554

Table 6: Selection 2. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	219764	205275	185394	140916	46972
$Pt56$	11.3	10.3	9.4	8.1	6.4
$\Delta\phi$	5.6	5.5	5.3	4.9	4.0
Pt^{out}	8.9	8.2	7.6	6.6	5.1
$Pt^{\eta>5}$	4.5	4.5	4.4	4.3	4.1
Pt^{5+6}	8.6	7.8	7.1	6.2	4.9
$Pt^{\gamma+part}$	8.7	7.9	7.2	6.3	4.9
$Pt^{\gamma+jet}$	8.2	7.6	7.1	6.2	5.0
$Pt^{\gamma+Jet}$	8.3	7.6	7.1	6.2	5.0
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	-0.0438	-0.0289	-0.0219	-0.0148	-0.0073
$1-cos(\Delta\phi)$	0.0073	0.0071	0.0067	0.0057	0.0040
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0510	-0.0358	-0.0284	-0.0204	-0.0112
Entries	6522	6092	5502	4182	1398

Table 7: Selection 3. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	204381	190906	170562	124006	35229
$Pt56$	10.8	9.6	8.7	7.5	5.9
$\Delta\phi$	5.5	5.3	5.1	4.6	3.6
Pt^{out}	8.5	7.7	7.1	6.1	4.3
$Pt^{\eta>5}$	4.5	4.4	4.3	4.3	4.0
Pt^{5+6}	8.1	7.2	6.6	5.7	4.5
$Pt^{\gamma+part}$	8.3	7.3	6.7	5.8	4.5
$Pt^{\gamma+jet}$	7.9	7.1	6.6	5.7	4.5
$Pt^{\gamma+Jet}$	7.9	7.1	6.6	5.7	4.5
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	-0.0408	-0.0268	-0.0201	-0.0142	-0.0042
$1-cos(\Delta\phi)$	0.0071	0.0067	0.0061	0.0051	0.0031
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	-0.0478	-0.0334	-0.0261	-0.0192	-0.0072
Entries	6065	5604	5061	3680	1049

Table 8: Selection 3. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	204381	190906	170562	124006	35229
$Pt56$	10.8	9.6	8.7	7.5	5.9
$\Delta\phi$	5.5	5.3	5.1	4.6	3.6
Pt^{out}	8.5	7.7	7.1	6.1	4.3
$Pt^{\eta>5}$	4.5	4.4	4.3	4.3	4.0
Pt^{5+6}	8.1	7.2	6.6	5.7	4.5
$Pt^{\gamma+part}$	8.3	7.3	6.7	5.8	4.5
$Pt^{\gamma+jet}$	7.9	7.1	6.6	5.7	4.6
$Pt^{\gamma+Jet}$	7.9	7.1	6.6	5.8	4.6
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	-0.0400	-0.0260	-0.0194	-0.0136	-0.0036
$1-cos(\Delta\phi)$	0.0072	0.0067	0.0062	0.0051	0.0032
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	-0.0470	-0.0326	-0.0255	-0.0186	-0.0066
Entries	6065	5604	5061	3680	1049

Appendix 2

$$100 < P_t^{\gamma} < 120\ GeV/c$$

Table 1: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 180^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	133709	95415	72927	45345	8654
$Pt56$	23.1	17.7	15.1	12.6	9.9
$\Delta\phi$	6.4	4.7	3.9	3.1	2.4
Pt^{out}	18.5	13.6	11.3	9.1	6.7
$Pt^{\eta>5}$	4.8	4.8	4.7	4.7	4.6
Pt^{5+6}	19.3	14.3	12.1	10.0	7.9
$Pt^{\gamma+part}$	19.1	14.3	12.1	10.1	8.0
$Pt^{\gamma+jet}$	18.8	14.0	11.7	9.6	7.5
$Pt^{\gamma+Jet}$	18.7	13.9	11.6	9.5	7.5
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0589	0.0335	0.0238	0.0170	0.0120
$1-cos(\Delta\phi)$	0.0120	0.0062	0.0042	0.0029	0.0024
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	0.0470	0.0273	0.0196	0.0141	0.0097
Entries	69710	49745	38021	23641	4512

Table 2: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 180^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	124587	87645	65928	38555	7720
$Pt56$	22.3	16.9	14.2	11.4	8.6
$\Delta\phi$	6.1	4.4	3.6	2.8	2.0
Pt^{out}	17.6	12.8	10.5	8.1	5.7
$Pt^{\eta>5}$	4.8	4.7	4.7	4.7	4.6
Pt^{5+6}	18.5	13.6	11.3	9.0	6.7
$Pt^{\gamma+part}$	18.4	13.6	11.4	9.1	6.7
$Pt^{\gamma+jet}$	18.0	13.2	10.9	8.5	6.4
$Pt^{\gamma+Jet}$	17.9	13.1	10.8	8.5	6.4
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0504	0.0268	0.0178	0.0104	0.0063
$1-cos(\Delta\phi)$	0.0108	0.0053	0.0035	0.0021	0.0012
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	0.0397	0.0215	0.0143	0.0083	0.0051
Entries	64954	45694	34372	20101	4025

Table 3: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	121445	92409	71951	45021	8568
$Pt56$	20.8	16.9	14.7	12.3	9.5
$\Delta\phi$	4.9	4.2	3.7	3.0	2.2
Pt^{out}	16.1	12.9	11.0	8.9	6.4
$Pt^{\eta>5}$	4.7	4.7	4.7	4.7	4.5
Pt^{5+6}	16.9	13.5	11.7	9.8	7.5
$Pt^{\gamma+part}$	16.8	13.6	11.8	9.8	7.6
$Pt^{\gamma+jet}$	16.3	13.1	11.3	9.3	7.2
$Pt^{\gamma+Jet}$	16.2	13.1	11.2	9.3	7.1
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0503	0.0312	0.0228	0.0162	0.0106
$1-cos(\Delta\phi)$	0.0060	0.0045	0.0035	0.0024	0.0015
$Pt(O+\eta>5)/Pt^{\gamma}$	0.0443	0.0268	0.0194	0.0138	0.0092
Entries	63316	48178	37512	23472	4467

Table 4: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	114477	85721	65481	38500	7703
$Pt56$	20.4	16.4	14.1	11.4	8.5
$\Delta\phi$	4.9	4.1	3.5	2.8	2.0
Pt^{out}	15.6	12.3	10.4	8.1	5.7
$Pt^{\eta>5}$	4.7	4.7	4.7	4.6	4.5
Pt^{5+6}	16.6	13.1	11.2	9.0	6.6
$Pt^{\gamma+part}$	16.5	13.1	11.2	9.0	6.7
$Pt^{\gamma+jet}$	15.8	12.6	10.7	8.5	6.4
$Pt^{\gamma+Jet}$	15.7	12.5	10.6	8.4	6.3
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0433	0.0254	0.0173	0.0103	0.0061
$1-cos(\Delta\phi)$	0.0059	0.0043	0.0032	0.0020	0.0011
$Pt(O+\eta>5)/Pt^{\gamma}$	0.0374	0.0212	0.0141	0.0083	0.0050
Entries	59683	44691	34139	20072	4019

Table 5: Selection 2. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	37984	31376	25953	17917	4672
$Pt56$	17.7	14.9	13.2	11.1	8.6
$\Delta\phi$	4.6	3.9	3.5	2.9	2.1
Pt^{out}	13.7	11.5	10.1	8.3	6.0
$Pt^{\eta>5}$	4.7	4.7	4.7	4.7	4.5
Pt^{5+6}	14.0	11.7	10.3	8.7	6.7
$Pt^{\gamma+part}$	14.3	12.0	10.5	8.8	6.9
$Pt^{\gamma+jet}$	13.8	11.6	10.2	8.5	6.7
$Pt^{\gamma+Jet}$	13.8	11.7	10.2	8.5	6.7
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	-0.0057	-0.0060	-0.0052	-0.0036	0.0006
$1-cos(\Delta\phi)$	0.0053	0.0040	0.0032	0.0022	0.0014
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0110	-0.0100	-0.0083	-0.0057	-0.0007
Entries	19803	16358	13531	9341	2436

Table 6: Selection 2. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	36338	29489	23986	15690	4157
$Pt56$	17.3	14.3	12.5	10.4	7.9
$\Delta\phi$	4.5	3.8	3.3	2.6	1.9
Pt^{out}	13.5	11.2	9.6	7.7	5.5
$Pt^{\eta>5}$	4.7	4.7	4.7	4.6	4.4
Pt^{5+6}	13.7	11.2	9.7	8.0	6.0
$Pt^{\gamma+part}$	13.9	11.5	9.9	8.2	6.1
$Pt^{\gamma+jet}$	13.6	11.3	9.7	7.9	6.0
$Pt^{\gamma+Jet}$	13.6	11.3	9.7	7.9	6.0
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	-0.0061	-0.0063	-0.0054	-0.0043	-0.0013
$1-cos(\Delta\phi)$	0.0052	0.0038	0.0029	0.0019	0.0011
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0113	-0.0101	-0.0083	-0.0061	-0.0023
Entries	18945	15374	12505	8180	2168

Table 7: Selection 3. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	34158	27425	22067	13807	3242
$Pt56$	15.7	12.8	11.0	9.1	7.2
$\Delta\phi$	4.2	3.4	2.9	2.3	1.8
Pt^{out}	12.3	9.8	8.4	6.6	4.6
$Pt^{\eta>5}$	4.7	4.7	4.7	4.6	4.6
Pt^{5+6}	12.3	10.0	8.5	6.9	5.4
$Pt^{\gamma+part}$	12.6	10.2	8.8	7.1	5.5
$Pt^{\gamma+jet}$	12.4	10.0	8.6	7.0	5.9
$Pt^{\gamma+Jet}$	12.4	10.1	8.6	7.0	5.9
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	-0.0060	-0.0048	-0.0043	-0.0017	0.0034
$1-cos(\Delta\phi)$	0.0045	0.0031	0.0023	0.0015	0.0011
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0105	-0.0079	-0.0066	-0.0032	0.0023
Entries	17808	14298	11505	7198	1691

Table 8: Selection 3. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	34158	27425	22067	13807	3242
$Pt56$	15.7	12.8	11.0	9.1	7.2
$\Delta\phi$	4.2	3.4	2.9	2.3	1.8
Pt^{out}	12.3	9.9	8.4	6.7	4.6
$Pt^{\eta>5}$	4.7	4.7	4.7	4.6	4.6
Pt^{5+6}	12.3	10.0	8.5	6.9	5.4
$Pt^{\gamma+part}$	12.6	10.2	8.8	7.1	5.5
$Pt^{\gamma+jet}$	12.4	10.1	8.6	7.0	5.9
$Pt^{\gamma+Jet}$	12.5	10.1	8.7	7.0	5.9
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	-0.0062	-0.0053	-0.0049	-0.0024	0.0023
$1-cos(\Delta\phi)$	0.0045	0.0031	0.0023	0.0015	0.0011
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0107	-0.0084	-0.0071	-0.0038	0.0013
Entries	17808	14298	11505	7198	1691

Appendix 3

$$200 < P_t^{\gamma} < 240\ GeV/c$$

Table 1: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 180^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	9389	6714	5065	3057	559
$Pt56$	24.5	19.7	17.2	14.3	10.8
$\Delta\phi$	3.2	2.4	2.0	1.6	1.2
Pt^{out}	18.5	14.1	11.7	9.3	6.8
$Pt^{\eta>5}$	4.8	4.8	4.7	4.7	4.6
Pt^{5+6}	20.0	15.9	13.8	11.4	8.7
$Pt^{\gamma+part}$	20.2	16.1	14.0	11.6	8.8
$Pt^{\gamma+jet}$	19.1	14.8	12.5	10.1	7.8
$Pt^{\gamma+Jet}$	19.0	14.7	12.4	10.0	7.8
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0202	0.0131	0.0097	0.0066	0.0042
$1-cos(\Delta\phi)$	0.0029	0.0016	0.0011	0.0007	0.0005
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	0.0173	0.0115	0.0086	0.0059	0.0037
Entries	52803	37761	28486	17192	3143

Table 2: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 180^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	8788	6185	4549	2589	495
$Pt56$	23.9	18.9	16.2	13.1	9.3
$\Delta\phi$	3.1	2.3	1.9	1.5	1.1
Pt^{out}	17.8	13.3	10.9	8.4	5.8
$Pt^{\eta>5}$	4.8	4.8	4.7	4.7	4.5
Pt^{5+6}	19.5	15.2	12.9	10.3	7.2
$Pt^{\gamma+part}$	19.6	15.3	13.0	10.5	7.4
$Pt^{\gamma+jet}$	18.4	14.0	11.6	9.1	6.7
$Pt^{\gamma+Jet}$	18.3	13.9	11.5	9.1	6.7
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0174	0.0101	0.0069	0.0039	0.0023
$1-cos(\Delta\phi)$	0.0026	0.0014	0.0009	0.0006	0.0003
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	0.0148	0.0087	0.0060	0.0034	0.0021
Entries	49425	34786	25582	14562	2786

Table 3: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180° \pm 15°$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	9343	6711	5064	3056	559
$Pt56$	24.3	19.7	17.1	14.3	10.8
$\Delta\phi$	3.1	2.4	2.0	1.6	1.2
Pt^{out}	18.2	14.0	11.7	9.3	6.8
$Pt^{\eta>5}$	4.8	4.8	4.7	4.7	4.6
Pt^{5+6}	19.8	15.9	13.7	11.4	8.7
$Pt^{\gamma+part}$	20.0	16.0	13.9	11.6	8.8
$Pt^{\gamma+jet}$	18.9	14.7	12.4	10.1	7.8
$Pt^{\gamma+Jet}$	18.7	14.6	12.4	10.0	7.7
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0198	0.0130	0.0097	0.0066	0.0041
$1-cos(\Delta\phi)$	0.0026	0.0016	0.0011	0.0007	0.0005
$Pt(O+\eta>5)/Pt^{\gamma}$	0.0172	0.0115	0.0086	0.0059	0.0037
Entries	52542	37741	28477	17189	3142

Table 4: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180° \pm 15°$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	8758	6183	4549	2589	503
$Pt56$	23.8	18.9	16.2	13.1	9.3
$\Delta\phi$	3.0	2.3	1.9	1.5	1.1
Pt^{out}	17.6	13.3	10.9	8.4	5.8
$Pt^{\eta>5}$	4.8	4.7	4.7	4.7	4.5
Pt^{5+6}	19.3	15.1	12.9	10.3	7.2
$Pt^{\gamma+part}$	19.5	15.3	13.0	10.5	7.4
$Pt^{\gamma+jet}$	18.2	14.0	11.6	9.1	6.7
$Pt^{\gamma+Jet}$	18.1	13.9	11.5	9.1	6.7
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0172	0.0101	0.0069	0.0039	0.0023
$1-cos(\Delta\phi)$	0.0025	0.0014	0.0009	0.0006	0.0003
$Pt(O+\eta>5)/Pt^{\gamma}$	0.0147	0.0087	0.0060	0.0034	0.0021
Entries	49253	34775	25582	14562	2786

Table 5: Selection 2. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	5797	4466	3558	2340	509
$Pt56$	21.6	17.7	15.5	13.2	10.4
$\Delta\phi$	2.9	2.3	1.9	1.6	1.2
Pt^{out}	16.3	12.9	10.9	8.9	6.7
$Pt^{\eta>5}$	4.8	4.8	4.7	4.7	4.6
Pt^{5+6}	17.2	14.0	12.2	10.4	8.3
$Pt^{\gamma+part}$	17.6	14.3	12.5	10.7	8.5
$Pt^{\gamma+jet}$	16.8	13.4	11.5	9.5	7.6
$Pt^{\gamma+Jet}$	16.8	13.4	11.5	9.5	7.6
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0014	0.0010	0.0015	0.0019	0.0030
$1-cos(\Delta\phi)$	0.0023	0.0014	0.0010	0.0007	0.0005
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0009	-0.0004	0.0005	0.0012	0.0025
Entries	32603	25116	20009	13160	2862

Table 6: Selection 2. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	5433	4114	3190	1971	442
$Pt56$	21.0	17.0	14.6	12.0	8.7
$\Delta\phi$	2.8	2.2	1.8	1.4	1.1
Pt^{out}	15.9	12.4	10.3	8.1	5.7
$Pt^{\eta>5}$	4.8	4.7	4.7	4.7	4.5
Pt^{5+6}	16.7	13.4	11.5	9.3	6.7
$Pt^{\gamma+part}$	17.1	13.7	11.8	9.6	6.8
$Pt^{\gamma+jet}$	16.4	12.8	10.8	8.7	6.6
$Pt^{\gamma+Jet}$	16.4	12.9	10.8	8.7	6.6
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0005	-0.0002	0.0001	0.0000	0.0009
$1-cos(\Delta\phi)$	0.0022	0.0013	0.0009	0.0005	0.0003
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0016	-0.0015	-0.0007	-0.0005	0.0006
Entries	30556	23138	17939	11085	2447

Table 7: Selection 3. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	5053	3826	2935	2735	327
$Pt56$	18.2	14.6	12.7	10.6	7.9
$\Delta\phi$	2.4	1.9	1.6	1.3	1.0
Pt^{out}	13.6	10.5	8.8	7.2	4.8
$Pt^{\eta>5}$	4.7	4.7	4.7	4.7	4.6
Pt^{5+6}	14.4	11.3	9.8	8.2	6.1
$Pt^{\gamma+part}$	14.7	11.6	10.1	8.4	6.2
$Pt^{\gamma+jet}$	14.2	11.1	9.4	8.0	6.3
$Pt^{\gamma+Jet}$	14.2	11.1	9.4	8.0	6.2
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0002	0.0004	0.0012	0.0013	0.0024
$1-cos(\Delta\phi)$	0.0016	0.0009	0.0006	0.0005	0.0003
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0014	-0.0005	0.0006	0.0009	0.0021
Entries	28417	21518	16504	9755	1811

Table 8: Selection 3. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	5053	3826	2935	2735	327
$Pt56$	18.2	14.6	12.7	10.6	7.9
$\Delta\phi$	2.4	1.9	1.6	1.3	1.0
Pt^{out}	13.7	10.5	8.8	7.1	4.7
$Pt^{\eta>5}$	4.7	4.7	4.7	4.7	4.6
Pt^{5+6}	14.4	11.3	9.8	8.2	6.1
$Pt^{\gamma+part}$	14.7	11.6	10.1	8.4	6.2
$Pt^{\gamma+jet}$	14.3	11.1	9.4	8.0	6.2
$Pt^{\gamma+Jet}$	14.3	11.1	9.5	8.0	6.2
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	-0.0005	-0.0004	0.0002	0.0000	0.0011
$1-cos(\Delta\phi)$	0.0016	0.0009	0.0006	0.0005	0.0003
$Pt(O+\eta>5)/Pt^{\gamma}$	-0.0021	-0.0013	-0.0005	-0.0005	0.0008
Entries	28417	21518	16504	9755	1811

Appendix 4

$$300 < P_t^{\gamma} < 360\ GeV/c$$

Table 1: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180° \pm 180°$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1872	1315	977	579	107
$Pt56$	26.7	21.7	18.8	15.7	12.7
$\Delta\phi$	2.2	1.7	1.4	1.1	0.8
Pt^{out}	19.0	14.5	12.1	9.7	7.0
$Pt^{\eta>5}$	4.8	4.7	4.7	4.7	4.6
Pt^{5+6}	21.8	17.6	15.2	12.7	10.4
$Pt^{\gamma+part}$	22.1	17.9	15.5	13.0	10.6
$Pt^{\gamma+jet}$	19.9	15.5	13.1	10.7	8.6
$Pt^{\gamma+Jet}$	19.8	15.4	13.0	10.6	8.6
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0124	0.0083	0.0059	0.0042	0.0029
$1-cos(\Delta\phi)$	0.0013	0.0008	0.0005	0.0003	0.0002
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	0.0111	0.0076	0.0054	0.0039	0.0027
Entries	46306	32515	24159	14319	2642

Table 2: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180° \pm 180°$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1752	1204	878	489	94
$Pt56$	26.0	20.7	17.7	14.2	10.9
$\Delta\phi$	2.1	1.6	1.3	1.0	0.7
Pt^{out}	18.4	13.7	11.3	8.6	5.9
$Pt^{\eta>5}$	4.8	4.8	4.7	4.6	4.5
Pt^{5+6}	21.2	16.7	14.2	11.3	8.7
$Pt^{\gamma+part}$	21.5	17.0	14.4	11.5	8.9
$Pt^{\gamma+jet}$	19.3	14.7	12.3	9.7	7.4
$Pt^{\gamma+Jet}$	19.1	14.6	12.2	9.6	7.4
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0107	0.0066	0.0046	0.0027	0.0016
$1-cos(\Delta\phi)$	0.0012	0.0007	0.0004	0.0003	0.0001
$Pt(O{+}\eta{>}5)/Pt^{\gamma}$	0.0095	0.0060	0.0041	0.0025	0.0015
Entries	43323	29783	21707	12104	2334

Table 3: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1872	1315	977	579	107
$Pt56$	26.7	21.7	18.8	15.7	12.7
$\Delta\phi$	2.2	1.7	1.4	1.1	0.8
Pt^{out}	19.0	14.5	12.1	9.7	7.0
$Pt^{\eta>5}$	4.8	4.7	4.7	4.7	4.6
Pt^{5+6}	21.8	17.6	15.2	12.7	10.4
$Pt^{\gamma+part}$	22.1	17.9	15.5	12.9	10.6
$Pt^{\gamma+jet}$	19.9	15.5	13.1	10.7	8.6
$Pt^{\gamma+Jet}$	19.7	15.4	13.0	10.6	8.6
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0124	0.0083	0.0059	0.0042	0.0029
$1-cos(\Delta\phi)$	0.0013	0.0008	0.0005	0.0003	0.0002
$Pt(O+\eta>5)/Pt^{\gamma}$	0.0111	0.0076	0.0054	0.0039	0.0027
Entries	46297	32513	24157	14318	2642

Table 4: Selection 1. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1752	1204	878	489	96
$Pt56$	26.0	20.7	17.7	14.2	10.9
$\Delta\phi$	2.1	1.6	1.3	1.0	0.7
Pt^{out}	18.4	13.7	11.3	8.6	5.9
$Pt^{\eta>5}$	4.8	4.8	4.7	4.6	4.5
Pt^{5+6}	21.1	16.7	14.2	11.3	8.7
$Pt^{\gamma+part}$	21.5	17.0	14.4	11.5	8.9
$Pt^{\gamma+jet}$	19.2	14.7	12.3	9.7	7.4
$Pt^{\gamma+Jet}$	19.1	14.6	12.2	9.6	7.4
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0107	0.0066	0.0046	0.0027	0.0016
$1-cos(\Delta\phi)$	0.0012	0.0007	0.0004	0.0003	0.0001
$Pt(O+\eta>5)/Pt^{\gamma}$	0.0095	0.0060	0.0041	0.0025	0.0015
Entries	43320	29783	21707	12104	2334

Table 5: Selection 2. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1464	1096	854	538	106
$Pt56$	24.5	20.3	17.9	15.2	12.5
$\Delta\phi$	2.1	1.6	1.4	1.1	0.8
Pt^{out}	17.4	13.7	11.6	9.5	7.0
$Pt^{\eta>5}$	4.7	4.7	4.7	4.7	4.6
Pt^{5+6}	19.7	16.3	14.3	12.2	10.2
$Pt^{\gamma+part}$	20.2	16.7	14.7	12.5	10.5
$Pt^{\gamma+jet}$	18.2	14.5	12.6	10.5	8.6
$Pt^{\gamma+Jet}$	18.2	14.5	12.5	10.4	8.6
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0034	0.0032	0.0028	0.0029	0.0028
$1-cos(\Delta\phi)$	0.0012	0.0007	0.0005	0.0003	0.0002
$Pt(O+\eta>5)/Pt^{\gamma}$	0.0022	0.0025	0.0023	0.0026	0.0026
Entries	36198	27104	21115	13303	2610

Table 6: Selection 2. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1359	993	756	448	94
$Pt56$	23.6	19.2	16.6	13.6	10.8
$\Delta\phi$	2.0	1.5	1.3	1.0	0.7
Pt^{out}	16.9	13.0	10.8	8.4	5.9
$Pt^{\eta>5}$	4.7	4.7	4.7	4.6	4.5
Pt^{5+6}	19.0	15.3	13.2	10.7	8.6
$Pt^{\gamma+part}$	19.4	15.7	13.5	11.0	8.8
$Pt^{\gamma+jet}$	17.8	13.9	11.8	9.4	7.3
$Pt^{\gamma+Jet}$	17.7	13.9	11.8	9.4	7.3
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0024	0.0020	0.0017	0.0014	0.0014
$1-cos(\Delta\phi)$	0.0011	0.0006	0.0004	0.0003	0.0001
$Pt(O+\eta>5)/Pt^{\gamma}$	0.0013	0.0014	0.0013	0.0011	0.0013
Entries	33599	24547	18686	11070	2287

Table 7: Selection 3. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. UA1 algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1264	925	696	394	70
$Pt56$	20.0	16.3	14.2	11.7	8.8
$\Delta\phi$	1.7	1.3	1.1	0.9	0.7
Pt^{out}	14.4	11.0	9.2	7.3	5.2
$Pt^{\eta>5}$	4.7	4.7	4.7	4.6	4.7
Pt^{5+6}	15.8	12.9	11.2	9.2	6.7
$Pt^{\gamma+part}$	16.3	13.2	11.5	9.4	6.9
$Pt^{\gamma+jet}$	15.3	12.0	10.4	8.5	7.4
$Pt^{\gamma+Jet}$	15.3	12.0	10.4	8.5	7.3
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0010	0.0016	0.0021	0.0026	0.00323
$1 - cos(\Delta\phi)$	0.0008	0.0005	0.0003	0.0002	0.0001
$Pt(O{+}\eta>5)/Pt^{\gamma}$	0.0002	0.0011	0.0018	0.0025	0.00312
Entries	31247	22829	17991	10301	1692

Table 8: Selection 3. $\Delta\phi_{(\gamma,jet)} = 180^\circ \pm 15^\circ$. LUCELL algorithm.

Pt^{clust}_{CUT}	30	20	15	10	5
Nevent	1264	925	696	394	70
$Pt56$	20.0	16.3	14.2	11.7	8.8
$\Delta\phi$	1.7	1.3	1.1	0.9	0.7
Pt^{out}	14.5	11.0	9.2	7.2	5.1
$Pt^{\eta>5}$	4.7	4.7	4.7	4.6	4.7
Pt^{5+6}	15.8	12.9	11.2	9.2	6.7
$Pt^{\gamma+part}$	16.3	13.2	11.5	9.4	6.9
$Pt^{\gamma+jet}$	15.4	12.0	10.3	8.5	7.3
$Pt^{\gamma+Jet}$	15.4	12.0	10.3	8.4	7.2
$(Pt^{\gamma}-Pt^{J})/Pt^{\gamma}$	0.0005	0.0008	0.0013	0.0016	0.0023
$1 - cos(\Delta\phi)$	0.0008	0.0005	0.0003	0.0002	0.0001
$Pt(O{+}\eta>5)/Pt^{\gamma}$	-0.0003	0.0004	0.0010	0.0014	0.0022
Entries	31247	22829	17991	10301	1692

References

[1] D.V. Bandourin, V.F. Konoplyanikov, N.B. Skachkov. "Jet energy scale setting with "$\gamma + Jet$" events at LHC energies. Generalities, selection rules", JINR Preprint E2-2000-251, JINR, Dubna.

[2] D.V. Bandourin, V.F. Konoplyanikov, N.B. Skachkov. "Jet energy scale setting with "$\gamma + Jet$" events at LHC energies. Event rates, P_t structure of jet", JINR Preprint E2-2000-252, JINR, Dubna.

[3] D.V. Bandourin, V.F. Konoplyanikov, N.B. Skachkov. "Jet energy scale setting with "$\gamma + Jet$" events at LHC energies. Selection of events with a clean "$\gamma + Jet$" topology and $P_t{}^{\gamma} - P_t{}^{Jet}$ disbalance", JINR Preprint E2-2000-254, JINR, Dubna.

[4] D.V. Bandourin, V.F. Konoplyanikov, N.B. Skachkov. "Jet energy scale setting with "$\gamma + Jet$" events at LHC energies. Detailed study of the background suppression". JINR Preprint E2-2000-255, JINR, Dubna.

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