$\gamma\gamma \to \gamma\gamma$ couplings for $\mu = 50$, $\int L\,\mathrm{d}t = 300\ fb^{-1}$ and at least one converted photon

O. Kepka, B. Lenzi, C. Royon, M. Saimpert

November 2013

cut/ a_1/Λ^4 coupling with f.f. (GeV^{-4})	10^{-12}	5.10^{-13}	4.10^{-13}	3.10^{-13}	2.10^{-13}	10^{-13}
MC scaling factor	6e-03	2e-03	1e-03	6e-04	2e-04	6e-05
$p_{T\ 1,2}^{\gamma} > 50\ GeV$, $\lvert\eta\rvert < 2.37$, $0.015 < \xi < 0.15$	519.3	129.8	83.1	46.7	20.8	5.2
$\mathrm{p}_{T,1}^{\gamma}$ 200 GeV,$\mathrm{p}_{T,2}^{\gamma} > 100\ GeV$	438.9	109.7	70.2	39.5	17.6	4.4
$\mathrm{W}^{\gamma\gamma} > 600\ GeV$	415.8	103.9	66.5	37.4	16.6	4.2
$\mathrm{p}_{T,2}^{\gamma}/\mathrm{p}_{T,1}^{\gamma} > 0.95$	415.7	103.9	66.5	37.4	16.2	4.2
$\Pi - \Delta\Phi < 0.01$ (no p_T ratio cut)	415.8	103.9	66.5	37.4	16.6	4.2
$\Pi - \Delta\Phi < 0.01$ (with p_T ratio cut)	415.7	103.9	66.5	37.4	16.6	4.2
$\mathrm{W}^{pp} = W^{\gamma\gamma} \pm 3\%$	391.7	98.0	62.7	35.2	15.7	3.9
Vertex requirement	391.7	98.0	62.7	35.2	15.7	3.9
$\lvert\Delta\eta^{pp} - \Delta\eta^{\gamma\gamma}\rvert < 2$	378.3	94.6	60.5	34.0	15.1	3.8

TABLE 1 – Signal

cut/process	DPE $\gamma\gamma$	DPE Higgs	DPE dijet	QED Excl. $\gamma\gamma$	QED Excl. ee	QCD Excl. $\gamma\gamma$
MC scaling factor	6e-03	1e-05	1.9e-05(mean), 5.2e-04(RMS)	4e-03	7e-05	3e-04
$p_{T\ 1,2}^{\gamma} > 50\ GeV$, $\lvert\eta\rvert < 2.37$, $0.015 < \xi < 0.15$	39.8	5.7e-02	8.3	7.1e-01	2e-02	3.0
$\mathrm{p}_{T,1}^{\gamma} > 200\ GeV$,$\mathrm{p}_{T,2}^{\gamma} > 100\ GeV$	1.5e-01	0.	4.3e-06	3.1e-02	2.5e-03	1.9e-01
$\mathrm{W}^{\gamma\gamma} > 600\ GeV$	2.8e-02	0.	2.7e-07	2e-02	1.5e-03	5.6e-02
$\mathrm{p}_{T,2}^{\gamma}/\mathrm{p}_{T,1}^{\gamma} > 0.95$	1.2e-02	0.	2e-08	2e-02	1.5e-03	5.6e-02
$\Pi - \Delta\Phi < 0.01$ (no p_T ratio cut)	3.6e-03	0.	2.3e-08	2e-02	1.5e-03	5.6e-02
$\Pi - \Delta\Phi < 0.01$ (with p_T ratio cut)	2.7e-03	0.	3.5e-09	2e-02	1.5e-03	5.6e-02
$\mathrm{W}^{pp} = W^{\gamma\gamma} \pm 3\%$	0.	0.	0.	2e-02	1.4e-03	5.3e-02
Vertex requirement	0.	0.	0.	2e-02	1.4e-03	5.3e-02
$\lvert\Delta\eta^{pp} - \Delta\eta^{\gamma\gamma}\rvert < 2$	0.	0.	0.	2e-02	1.3e-03	5.1e-02

TABLE 2 – DPE and Exclusive Background

cut/process	ND dijet	ND DY ee	ND $\gamma\gamma$
MC scaling factor (high E/p_T)	5e-04(mean), 2.3e-03(RMS)	9e-06	5.6e-02
MC scaling factor (low E/p_T)	0.84(mean), 0.61(RMS)	0.18	554
$p_{T\ 1,2}^{\gamma} > 50\ GeV$, $\lvert\eta\rvert < 2.37$, $0.015 < \xi < 0.15$	2.8e+04	84.2	1.03e+05
$\mathrm{p}_{T,1} > 200\ GeV$,$\mathrm{p}_{T,2} > 100\ GeV$	1.6e-01	1.46	2968.2
$\mathrm{W}^{\gamma\gamma} > 600\ GeV$	3.6e-02	2e-01	1022.7
$\mathrm{p}_{T,2}/\mathrm{p}_{T,1} > 0.95$	1.2e-03	8.7e-02	413.5
$\Pi - \Delta\Phi < 0.01$ (no p_T ratio cut)	1.3e-03	2.5e-02	115.2
$\Pi - \Delta\Phi < 0.01$ (with p_T ratio cut)	1.3e-04	1.8e-02	80.2
$\mathrm{W}^{pp} = W^{\gamma\gamma} \pm 3\%$	4.4e-06	6.4e-04	2.8
Vertex requirement	1.1e-07	1.6e-05	7.0e-02
$\lvert\Delta\eta^{pp} - \Delta\eta^{\gamma\gamma}\rvert < 2$	2.5e-09	2.9e-07	1.1e-03

TABLE 3 – Pile-up Background