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# NLO-NLL wino-like chargino-chargino ( $\tilde{\chi}_2^\pm \tilde{\chi}_1^\pm$ ) cross sections

The following cross sections are for wino-like chargino-chargino pair production ( $\tilde{\chi}_2^\pm \tilde{\chi}_1^\pm$ ). They have been calculated for  $\sqrt{s} = 13$  TeV at NLO-NLL using the resumino code from B. Fuks et al with CTEQ6.6 and MSTW2008nlo90cl PDFs. Final numbers are calculated using the PDF4LHC recommendations for the two sets of cross sections.

The following sentence accurately describes all the assumptions in the cross sections calculation and is suitable to be included in the interpretation description:

The production cross sections are computed at NLO plus next-to-leading-log (NLL) precision in a limit of mass-degenerate wino  $\tilde{\chi}_2^\pm$  and  $\tilde{\chi}_1^\pm$ , light bino  $\tilde{\chi}_1^0$ , and with all the other sparticles assumed to be heavy and decoupled.

The slha file used to produce these numbers can found in the attachment below: wino.dat

When using these cross sections, please cite the following two references, available below in bibtex format:

Show References  Hide References

```
@article{Fuks:2012qx,
  author      = "Fuks, Benjamin and Klasen, Michael and Lamprea, David R.
                and Rothering, Marcel",
  title       = "{Gaugino production in proton-proton collisions at a
                center-of-mass energy of 8 TeV}",
  journal     = "JHEP",
  volume      = "10",
  pages       = "081",
  doi         = "10.1007/JHEP10(2012)081",
  year        = "2012",
  eprint      = "1207.2159",
  archivePrefix = "arXiv",
  primaryClass = "hep-ph",
  reportNumber = "IPHC-PHENO-12-07, MS-TP-12-05",
  SLACcitation = "%%CITATION = ARXIV:1207.2159;%%",
}
```

```
@article{Fuks:2013vua,
  author      = "Fuks, Benjamin and Klasen, Michael and Lamprea, David R.
                and Rothering, Marcel",
  title       = "{Precision predictions for electroweak superpartner
                production at hadron colliders with {\sc Resumino}}",
  journal     = "Eur. Phys. J. C",
  volume      = "73",
  pages       = "2480",
  doi         = "10.1140/epjc/s10052-013-2480-0",
  year        = "2013",
  eprint      = "1304.0790",
  archivePrefix = "arXiv",
  primaryClass = "hep-ph",
  reportNumber = "CERN-PH-TH-2013-064, IPhC-PHENO-13-02, MS-TP-13-06",
  SLACcitation = "%%CITATION = ARXIV:1304.0790;%%",
}
```

Should the analyzer need the cross-section information for a mass value that is not tabulated below, s/he can obtain it using the ROOT macros provided under:

/afs/cern.ch/user/a/amete/public/EWKGauginoCrossSections\_13TeV

For this specific grid one needs to do:

```
root -l 'get_gaugino.C("C1C1", "wino", mass)'
```

where

mass

is the mass of the sparticle in GeV. The result of the interpolation can be seen here.

## NLO-NLL wino-like + -

m [GeV]	xsec [fb]	uncertainty [fb]
100	11611.9	518.613
125	5090.52	249.469
150	2612.31	138.156
175	1482.42	83.2672
200	902.569	53.7411
225	579.564	36.0699
250	387.534	25.3131
275	267.786	18.2886
300	190.159	13.4438
325	138.086	10.1835
350	102.199	7.75261
375	76.8342	6.02606
400	58.6311	4.7276
425	45.2189	3.71547
450	35.3143	2.97283
475	27.8342	2.41224
500	22.1265	1.94904
525	17.7394	1.5992
550	14.3134	1.32368
575	11.6266	1.09669
600	9.49913	0.912324
625	7.80081	0.768988
650	6.43244	0.638889
675	5.33642	0.541519
700	4.4387	0.457123
725	3.70675	0.385799
750	3.10861	0.330353
775	2.61656	0.283139
800	2.21197	0.245196
825	1.86142	0.201762
850	1.58356	0.177806
875	1.34699	0.150075
900	1.15301	0.135822
925	0.981406	0.114539
950	0.842779	0.102086
975	0.713432	0.0779702

1000	0.621866	0.0771005
1025	0.535563	0.0667594
1050	0.458716	0.0569349
1075	0.398794	0.0506191
1100	0.342626	0.0427672
1125	0.301119	0.0414674
1150	0.262408	0.0373521
1175	0.224723	0.0301438
1200	0.196044	0.0264135
1225	0.168114	0.021483
1250	0.148219	0.0198313
1275	0.128682	0.0173508
1300	0.115645	0.018756
1325	0.0987141	0.014292
1350	0.0881654	0.0135402
1375	0.0778987	0.0131703
1400	0.0686671	0.0114478
1425	0.0591995	0.00946571
1450	0.0505255	0.00707791
1475	0.0478698	0.00982729
1500	0.0396228	0.00627315
1525	0.0348558	0.00559845
1550	0.0307165	0.00495763
1575	0.0271112	0.00435237
1600	0.0239083	0.00394854
1625	0.0209953	0.00362692
1650	0.0186409	0.003244
1675	0.01647	0.00285616
1700	0.0144992	0.00249881
1725	0.0128156	0.00222519
1750	0.0113544	0.00198711
1775	0.0100029	0.00178698
1800	0.0088942	0.00155231
1825	0.00788156	0.00139556
1850	0.00695506	0.001247
1875	0.00614707	0.00114377
1900	0.00543469	0.00102872
1925	0.00485995	0.000924302
1950	0.00432007	0.000896908
1975	0.00371358	0.000851482
2000	0.00323064	0.000814089

**CTEQ6.6 numbers: NLO-NLL wino-like**    +    -

m [GeV]	xsec [fb]	-scale unc [%]	-pdf unc [%]	+scale unc [%]	+pdf unc [%]
100	11457.2	-0.3	-3	0.1	2.9
125	5000.44	-0.4	-3	0.3	3
150	2558.47	-0.5	-3.1	0.4	3.1
175	1448.48	-0.6	-3.2	0.5	3.3
200	880.476	-0.6	-3.4	0.5	3.5

SUSYCrossSections13TeVx1x1wino < LHCPysics < TWiki

225	564.313	-0.6	-3.5	0.5	3.7
250	376.84	-0.6	-3.7	0.5	3.9
275	260.084	-0.6	-3.9	0.5	4
300	184.398	-0.6	-4	0.5	4.2
325	133.714	-0.5	-4.2	0.5	4.5
350	98.838	-0.5	-4.3	0.4	4.6
375	74.251	-0.5	-4.5	0.4	4.9
400	56.582	-0.5	-4.6	0.4	5
425	43.655	-0.5	-4.8	0.4	5.3
450	34.053	-0.5	-4.9	0.3	5.4
475	26.82	-0.4	-5.1	0.3	5.6
500	21.309	-0.4	-5.2	0.3	5.8
525	17.063	-0.4	-5.3	0.2	6
550	13.76	-0.3	-5.5	0.2	6.2
575	11.166	-0.3	-5.6	0.2	6.4
600	9.115	-0.3	-5.7	0.1	6.6
625	7.48	-0.3	-5.9	0.1	6.8
650	6.169	-0.2	-6	0.1	7
675	5.111	-0.2	-6.1	0	7.2
700	4.253	-0.2	-6.3	0	7.3
725	3.551	-0.1	-6.4	0	7.5
750	2.977	-0.1	-6.6	0	7.6
775	2.503	-0.1	-6.7	0	7.8
800	2.112	-0.2	-6.8	0	8
825	1.786	-0.2	-7	0	8.1
850	1.516	-0.2	-7.2	0	8.2
875	1.288	-0.1	-7	0	8.8
900	1.097	-0.3	-7.2	0.2	8.9
925	0.939	-0.5	-7.6	0.1	8.5
950	0.804	-0.4	-7.8	0	8.6
975	0.689	-0.3	-7.7	0.2	9.2
1000	0.592	-0.5	-7.9	0.2	9.3
1025	0.51	-0.5	-8	0.2	9.4
1050	0.44	-0.7	-8.6	0.1	9.1
1075	0.38	-0.5	-8.3	0.3	9.7
1100	0.328	-0.6	-8.5	0.2	10
1125	0.284	-0.5	-8.5	0.4	10.5
1150	0.247	-0.7	-8.8	0.4	10.5
1175	0.214	-0.6	-9	0.4	10.4
1200	0.187	-0.8	-9.2	0.4	10.5
1225	0.162	-0.8	-9.4	0.4	10.7
1250	0.142	-0.8	-9.5	0.5	11
1275	0.123	-0.8	-9.4	0.5	11.9
1300	0.108	-0.9	-10.2	0.4	11.2
1325	0.094	-0.9	-10.1	0.5	11.7
1350	0.083	-0.9	-10	0.7	12
1375	0.072	-1	-10	0.8	12.3
1400	0.064	-1	-10.5	0.7	11.9
1425	0.056	-1	-11.1	0.7	12.4
1450	0.049	-1.4	-11.2	0.4	12.7

1475	0.043	-1.4	-11.4	0.7	12.9
1500	0.0375752	-1.5	-11.1	1.2	13.4
1525	0.0330747	-1.5	-11.4	1.3	13.7
1550	0.0291198	-1.5	-11.4	1.4	14.5
1575	0.025671	-1.5	-11.2	1.5	15.2
1600	0.0226399	-1.5	-11.7	1.9	16
1625	0.0200683	-2.4	-13.2	1.6	14.8
1650	0.0177339	-2.5	-12.9	1.6	15.5
1675	0.0156837	-2.6	-12.9	1.7	15.6
1700	0.0138762	-2.2	-13.3	1.7	15.1
1725	0.0122833	-2	-13.6	1.7	15.6
1750	0.0108791	-2.1	-13.7	1.8	16.4
1775	0.00964131	-2.1	-14.6	1.8	16.6
1800	0.0085226	-1.8	-13.7	1.9	17.4
1825	0.00756007	-2.2	-14	1.5	18.2
1850	0.00670845	-2.3	-14.7	1.3	18.4
1875	0.00595739	-2.3	-15.1	1.2	18
1900	0.00528231	-2.2	-15.9	1.5	22.1
1925	0.00467608	-1.8	-15.7	1.9	19.8
1950	0.0041441	-1.6	-15.5	1.9	25.8
1975	0.00375435	-3.4	-23.5	0.6	13.9
2000	0.00336575	-5.2	-27.7	1.2	12.9

**MSTW2008nlo90cl numbers: NLO-NLL wino-like** + -

m [GeV]	xsec [fb]	-scale unc [%]	-pdf unc [%]	+scale unc [%]	+pdf unc [%]
100	11743	-1.1	-3	0	3.3
125	5169.4	-0.7	-3.1	0	3.3
150	2662.6	-0.7	-3.1	0	3.3
175	1514.2	-0.6	-3.2	0	3.4
200	923.92	-0.5	-3.3	0.2	3.5
225	594.17	-0.5	-3.5	0.3	3.6
250	398.07	-0.5	-3.6	0.3	3.7
275	275.57	-0.5	-3.7	0.3	3.8
300	195.9	-0.4	-3.8	0.5	3.9
325	142.37	-0.4	-3.9	0.6	4.1
350	105.49	-0.4	-4	0.5	4.2
375	79.43	-0.4	-4.1	0.4	4.3
400	60.62	-0.4	-4.1	0.4	4.5
425	46.87	-0.4	-4.4	0.2	4.4
450	36.6	-0.4	-4.5	0.3	4.6
475	28.86	-0.3	-4.4	0.2	4.8
500	22.95	-0.3	-4.5	0.2	4.9
525	18.4	-0.1	-4.4	0.1	5.1
550	14.85	-0.2	-4.5	0	5.3
575	12.06	-0.2	-4.5	0	5.5
600	9.85	-0.2	-4.6	0	5.7
625	8.1	-0.2	-4.7	0	5.8
650	6.69	-0.2	-4.9	0	5.7
675	5.54	-0.4	-4.7	0	6.1

SUSYCrossSections13TeVx1x1wino < LHCPHysics < TWiki

700	4.61	-0.4	-5	0	6.2
725	3.85	-0.7	-4.9	0	6.3
750	3.22	-0.7	-4.9	0	6.8
775	2.71	-0.6	-5	0	7
800	2.29	-0.5	-5.3	0	7.3
825	1.93	-0.7	-5.3	0.1	6.9
850	1.64	-0.9	-5.4	0.1	7.4
875	1.39	-0.6	-5.6	0.2	7.7
900	1.19	-0.7	-5.4	0.3	8.3
925	1.01	-1	-5.5	0.4	8.5
950	0.87	-1.2	-5.7	0.3	8.6
975	0.74	-1	-4.6	0.8	6.9
1000	0.64	-1.3	-5.8	0.5	9.2
1025	0.55	-1	-6.1	0.5	9.5
1050	0.47	-1	-6.1	0.5	9.7
1075	0.41	-1.1	-6.7	0.5	9.6
1100	0.35	-1.1	-6.6	0.5	10.1
1125	0.31	-1	-6.7	0.5	10.5
1150	0.27	-1	-6.8	0.7	11
1175	0.23	-1.5	-7.6	0.5	10.8
1200	0.2	-1.4	-7.3	0.8	11.2
1225	0.17	-1.4	-7.6	0.8	11.5
1250	0.15	-1.4	-7.8	0.9	12
1275	0.13	-1.4	-7.9	0.9	12.3
1300	0.12	-1.9	-9.6	0.1	12
1325	0.1	-1.6	-8.2	0.4	13
1350	0.09	-1.7	-8.4	0.4	13
1375	0.08	-1.1	-8.6	1	13.8
1400	0.07	-1.1	-9.2	1.2	14.4
1425	0.06	-1.5	-9.8	1.1	14.4
1450	0.05	-1.7	-9.1	1.8	15.1
1475	0.05	-1.9	-9.6	1.7	15.3
1500	0.0396777	-1.9	-10	1.5	15.6
1525	0.0348504	-2	-10.3	1.6	16
1550	0.0306274	-2	-10.5	1.6	16.4
1575	0.0269641	-2.1	-10.9	1.7	16.6
1600	0.0236914	-1.6	-11	1.7	17.5
1625	0.0208521	-2.2	-11.4	1.7	18
1650	0.0183612	-2.2	-11.6	2.7	19
1675	0.0161748	-2.3	-11.8	1.8	19.4
1700	0.0143338	-2.2	-13.2	1.8	18.5
1725	0.0125662	-2.4	-12.8	1.9	19.6
1750	0.0110821	-2.4	-13.1	1.9	20.3
1775	0.00977625	-2.5	-13.5	2	20.5
1800	0.00862671	-2.5	-13.8	2	21
1825	0.00762398	-2.7	-14	1.9	21.6
1850	0.0068088	-3	-15.8	1.6	20.4
1875	0.00603353	-4	-16.6	2.4	20.7
1900	0.00531043	-2.8	-16.8	2.2	21.6
1925	0.00464231	-1.8	-15	2.2	24.5

SUSYCrossSections13TeVx1x1wino < LHCPHysics < TWiki

1950	0.00410234	-2.9	-16.3	2	24.7
1975	0.00363257	-2.1	-15.9	1.9	25.6
2000	0.00320795	-3.1	-17.1	2.1	26

-- LesyaShchutska - 2015-02-11

This topic: LHCPHysics > SUSYCrossSections13TeVx1x1wino

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