

Table of Contents

NLO+NNLL wino-like $\tilde{C}\tilde{C}1$ cross sections.....	1
NLO+NNLL \tilde{W} no cross sections for 02^{-1} production at \sqrt{s} = 27 TeV.....	4

NLO-NLL wino-like $\tilde{C}\tilde{C}$ cross sections

The following cross sections are for wino-like chargino-chargino pair production. They have been calculated for $\sqrt{s} = 27$ TeV at NLO-NLL using Resumino 2.0.1 from B. Fuks et al. The Monte Carlo PDF set with 100 replicas PDF4LHC15_mc is used, which is a statistical combination of CT14, MMHT14 and NNPDF3.0, all using $\alpha_s(m_Z^2) = 0.118$. The use of this combination of PDF sets is recommended for searches for new Physics by the PDF4LHC Working Group. See <https://arxiv.org/abs/1510.03865> for more details.

The cross sections are computed for degenerate charginos and neutralinos. The mass is denoted as m . The following sentence describes all the assumptions in the cross section calculations and is suitable to be included in the description of the interpretation of your results:

The production cross sections are computed at NLO plus next-to-next-to-leading-log (NNLL) precision in a limit of mass-degenerate wino $\chi_{2\pm}^0$ and $\chi_{1\pm}^0$ with all the other sparticles assumed to be heavy and decoupled.

When using these cross sections, some references have to be cited. They can be found below in bibtex format. The references can also be downloaded from this Twiki, see attachments at the bottom

Show References Hide References

Resumino:

```
@article{Debove:2010kf,
  author      = "Debove, Jonathan and Fuks, Benjamin and Klasen, Michael",
  title       = "{Threshold resummation for gaugino pair production at hadron colliders}",
  journal     = "Nucl. Phys. B",
  volume     = "842",
  year       = "2011",
  pages      = "51-85",
  doi        = "10.1016/j.nuclphysb.2010.08.016",
  eprint     = "1005.2909",
  archivePrefix = "arXiv",
  primaryClass = "hep-ph",
  reportNumber = "IPHC-PHENO-10-02, LPSC-10-050",
  SLACcitation = "%%CITATION = ARXIV:1005.2909;%%"
}
@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 Resummino}}",
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;%"
}
@article{Fiaschi:2018hgm,
author     = "Fiaschi, Juri and Klasen, Michael",
title      = "{Neutralino-chargino pair production at NLO+NLL with
              resummation-improved parton density functions for LHC Run
              II}",
journal    = "Phys. Rev. D",
volume     = "98",
year       = "2018",
number     = "5",
pages      = "055014",
doi        = "10.1103/PhysRevD.98.055014",
eprint     = "1805.11322",
archivePrefix = "arXiv",
primaryClass = "hep-ph",
reportNumber = "MS-TP-18-19",
SLACcitation = "%CITATION = ARXIV:1805.11322;%"
}

```

LHAPDF:

```

@article{Buckley:2014ana,
author     = "Buckley, Andy and Ferrando, James and Lloyd, Stephen and
              Nordström, Karl and Page, Ben and Rufenacht, Martin and
              Schönherr, Marek and Watt, Graeme",
title      = "{LHAPDF6: parton density access in the LHC precision
              era}",
journal    = "Eur. Phys. J. ",
volume     = "C75",
year       = "2015",
pages      = "132",
doi        = "10.1140/epjc/s10052-015-3318-8",
eprint     = "1412.7420",
archivePrefix = "arXiv",
primaryClass = "hep-ph",
reportNumber = "GLAS-PPE-2014-05, MCNET-14-29, IPPP-14-111, DCPT-14-222",
SLACcitation = "%CITATION = ARXIV:1412.7420;%"
}

```

PDF4LHC:

```

@article{Butterworth:2015oua,
author     = "Butterworth, Jon and others",
title      = "{PDF4LHC recommendations for LHC Run II}",
journal    = "J. Phys.",
volume     = "G43",
year       = "2016",
pages      = "023001",
doi        = "10.1088/0954-3899/43/2/023001",
eprint     = "1510.03865",
archivePrefix = "arXiv",
primaryClass = "hep-ph",
reportNumber = "OUTP-15-17P, SMU-HEP-15-12, TIF-UNIMI-2015-14",
}

```

SUSYNLONLLCROSSSECTIONS27TeVWNO-C1C1 < LHCPHYSICS < TWKI

```

        LCTS-2015-27, CERN-PH-TH-2015-249",
SLACcitation = "%CITATION = ARXIV:1510.03865;%"
}
@article{Carrazza:2015hva,
  author      = "Carrazza, Stefano and Latorre, José I. and Rojo, Juan
                and Watt, Graeme",
  title       = "{A compression algorithm for the combination of PDF
                sets}",
  journal     = "Eur. Phys. J.",
  volume      = "C75",
  year        = "2015",
  pages       = "474",
  doi         = "10.1140/epjc/s10052-015-3703-3",
  eprint      = "1504.06469",
  archivePrefix = "arXiv",
  primaryClass = "hep-ph",
  reportNumber = "TIF-UNIMI-2015-2, OUTP-15-01P, IPPP-15-22, DCPT-15-44",
  SLACcitation = "%CITATION = ARXIV:1504.06469;%"
}
@article{Watt:2012tq,
  author      = "Watt, G. and Thorne, R. S.",
  title       = "{Study of Monte Carlo approach to experimental
                uncertainty propagation with MSTW 2008 PDFs}",
  journal     = "JHEP",
  volume      = "08",
  year        = "2012",
  pages       = "052",
  doi         = "10.1007/JHEP08(2012)052",
  eprint      = "1205.4024",
  archivePrefix = "arXiv",
  primaryClass = "hep-ph",
  reportNumber = "CERN-PH-TH-2012-132, LCTS-2012-11",
  SLACcitation = "%CITATION = ARXIV:1205.4024;%"
}

```

CT14:

```

@article{Dulat:2015mca,
  author      = "Dulat, Sayipjamal and Hou, Tie-Jiun and Gao, Jun and
                Guzzi, Marco and Huston, Joey and Nadolsky, Pavel and
                Pumplin, Jon and Schmidt, Carl and Stump, Daniel and Yuan,
                C. P.",
  title       = "{New parton distribution functions from a global analysis
                of quantum chromodynamics}",
  journal     = "Phys. Rev.",
  volume      = "D93",
  year        = "2016",
  number      = "3",
  pages       = "033006",
  doi         = "10.1103/PhysRevD.93.033006",
  eprint      = "1506.07443",
  archivePrefix = "arXiv",
  primaryClass = "hep-ph",
  SLACcitation = "%CITATION = ARXIV:1506.07443;%"
}

```

MMHT14:

```

@article{Harland-Lang:2014zoa,
  author      = "Harland-Lang, L. A. and Martin, A. D. and Motylinski, P.
                and Thorne, R. S.",
  title       = "{Parton distributions in the LHC era: MMHT 2014 PDFs}",
  journal     = "Eur. Phys. J.",
  volume      = "C75",
  year        = "2015",
  number      = "5",

```

SUSYLNLL Cross Sections 27TeV $W_0 C1C1$ < LHCPHysics < TWiki

```

pages          = "204",
doi            = "10.1140/epjc/s10052-015-3397-6",
eprint        = "1412.3989",
archivePrefix = "arXiv",
primaryClass  = "hep-ph",
reportNumber  = "LCTS-2014-47, IPPP-14-97, DCPT-14-194",
SLACcitation  = "%%CITATION = ARXIV:1412.3989;%%"
}

```

NNPDF:

```

@article{Ball:2014uwa,
  author       = "Ball, Richard D. and others",
  title        = "{Parton distributions for the LHC Run II}",
  collaboration = "NNPDF",
  journal      = "JHEP",
  volume       = "04",
  year         = "2015",
  pages        = "040",
  doi          = "10.1007/JHEP04(2015)040",
  eprint       = "1410.8849",
  archivePrefix = "arXiv",
  primaryClass = "hep-ph",
  reportNumber = "EDINBURGH-2014-15, IFUM-1034-FT, CERN-PH-TH-2013-253,
    OUTP-14-11P, CAVENDISH-HEP-14-11",
  SLACcitation = "%%CITATION = ARXIV:1410.8849;%%"
}

```

To calculate these cross sections, this repository [can be used](#). The SLHA files can be found there as well: [wino.in](#) and [hino.in](#).

Should cross section information be needed for a mass that is not tabulated below, one can obtain it by 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+NNLL W_0 no cross sections for W_2^{-1} production at $\sqrt{s} = 27\text{ TeV}$

m [GeV]	[fb]	uncertainty [fb]
50	3.9216e+05	670
75	62714	83.73
100	22414	26.62
125	10328	11.68
150	5486.9	6.033
175	3210.2	3.437

NLO+NNLL W_0 no cross sections for W_2^{-1} production at $\sqrt{s} = 27\text{ TeV}$

SUSYLNLO+NNLL Cross Sections $27\text{ TeV} \leq \sqrt{s} < 100\text{ TeV}$ for $W \rightarrow W + 2\text{ jets}$ production at $\sqrt{s} = 27\text{ TeV}$

200	2012.3	2.108
225	1328.2	1.365
250	912.82	0.9222
275	648.06	0.6438
300	472.53	0.463
325	352.32	0.3451
350	267.76	0.259
375	206.86	0.1977
400	162.1	0.1555
425	128.64	0.1221
450	103.23	0.09699
475	83.662	0.07785
500	68.411	0.06308
525	56.396	0.05244
550	46.828	0.04317
575	39.142	0.03578
600	32.917	0.02985
625	27.837	0.02505
650	23.663	0.02114
675	20.206	0.01733
700	17.333	0.01478
725	14.93	0.01266
750	12.91	0.01088
775	11.202	0.009395
800	9.7532	0.008139
825	8.5185	0.007075
850	7.4619	0.006168
875	6.5548	0.005393
900	5.7732	0.004806
925	5.097	0.004224
950	4.5106	0.003722
975	4.0004	0.003287
1000	3.5553	0.002908
1025	3.1663	0.00258
1050	2.8251	0.002293

1950	0.10216	7.49e-05
1975	0.094462	6.907e-05
2000	0.087381	6.374e-05

-- BasilSchneider - 2018-11-14

This topic: LHCPHysics > SUSYNLONLLCrossSections27TeVnoC1C1

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