Table of Contents

Supersymmetry studies for the FCC-hh....1
Ongoing work....1
SUSY production cross sections at 33 and 100 TeV:....1
Values for some reference processes are given here (compiled by Anna Sfyrla):....1
Literature....2
Other relevant bibliography from Snowmass for pp collider studies at 33 and 100 TeV:....2
Other useful information....2
Benchmarks....2

Supersymmetry studies for the FCC-hh

Conveners: Matthew Mc Cullough (TH), Mike Hance (EXP)

Ongoing work

- Exploring pMSSM at 100 TeV (N. Mahmoudi et al)
  Show Details Hide Details
  - Goal of the project:
  - Status:
  - Slides

- Rare production mechanisms in SUSY
  Show Details Hide Details
  - Goal of the project:
  - Status: looking for experimental collaborators to carry out simulations
  - Slides

SUSY production cross sections at 33 and 100 TeV:

The compilation of cross sections and tools is maintained in the twiki page of the LHC SUSY Cross Section WG. The results are documented in arXiv:1407.5066

Values for some reference processes are given here (compiled by Anna Sfyrla):

- Stop/sbottom pair-production NLO cross sections with light squarks and gluinos decoupled

Show Cross Sections Hide Cross Sections

squark mass [GeV]	33 TeV xsec [pb]	100 TeV xsec [pb]
200.0	441.	3000
300.0	75.5	620.
400.0	20.4	195.
500.0	7.08	77.5
600.0	2.97	36.6
700.0	1.33	18.4
800.0	0.666	10.2
900.0	0.367	6.25
1000.0	0.212	3.95
1200.0	0.857E-01	1.82
1400.0	0.368E-01	0.939

- Gluino pair-production NLO cross sections with all squarks decoupled

Show Cross Sections Hide Cross Sections

gluino mass [GeV]	33 TeV xsec [pb]	100 TeV xsec [pb]
600.0	155.	2010
700.0	70.5	1030
800.0	35.0	566.
900.0	18.6	332.

950.0	13.8	260.
1000.0	10.4	205.
1100.0	6.09	131.
1200.0	3.70	87.1
1300.0	2.32	59.4
1400.0	1.49	41.5
1500.0	0.981	29.6
1600.0	0.659	21.5
1700.0	0.451	15.9
1800.0	0.313	11.9
1900.0	0.220	9.03
2000.0	0.157	6.94
2200.0	0.822E-01	4.18
2500.0	0.333E-01	2.09
3000.0	0.852E-02	0.753

Literature

- *The Relic Neutralino Surface at a 100 TeV Collider*, J.Bramante et al, arXiv:1412.4789
- *Prospects for Electroweakino Discovery at a 100 TeV Hadron Collider*, S.Gori et al, arXiv:1410.6298
- *Prospects for observing charginos and neutralinos at a 100 TeV proton-proton collider*, B.Acharya et al, arXiv:1410.1532
- *Superpartners at LHC and Future Colliders: Predictions from Constrained Compactified M-Theory*, S.A.R.Ellis et al, arXiv:1408.1961
- *Boosting Stop Searches with a 100 TeV Proton Collider*, T.Cohen et al, arXiv:1406.4512
- *Squark and gluino production cross sections in pp collisions at sqrt{s}=13,14,33 and 100 TeV*, C.Borschensky et al, arXiv:1407.5066
- *Prospects for constrained supersymmetry at $\sqrt{s}=33$ TeV and $\sqrt{s}=100$ TeV proton-proton super-colliders*, A.Fowlie and M.Raidal, arXiv:1402.5419
- *SUSY Simplified Models at 14, 33, and 100 TeV Proton Colliders*, T.Cohen et al, arXiv:1311.6480
- *A Comparison of Future Proton Colliders Using SUSY Simplified Models: A Snowmass Whitepaper*, T.Cohen et al, http://arxiv.org/abs/arXiv:1310.0077
- *Reach in All Hadronic Stop Decays: A Snowmass White Paper*, D.Stolarski, arXiv:1309.1514
- *Sensitivity of future collider facilities to WIMP pair production via effective operators and light mediators*, N.Zhou et al, arXiv:1307.5327

Other relevant bibliography from Snowmass for pp collider studies at 33 and 100 TeV:

- Snowmass simulation framework and SM event generation: arXiV:1308.1636 and arXiV:1309.1057

Other useful information

- (CMS private) SUSY future projections: twiki

Benchmarks

TBD

Values for some reference processes are given here (compiled by AnnaSfyrla):

This topic: LHCPhysics > SUSY
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