

# DBD SiD/ILD Higgs Branching Ratio Analyses

Presented by  
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*The Joint SiD/ILD Mtg. (24 Jan. 2013)*

# Status from last meeting

Cuts	$h \rightarrow b\bar{b}$	$h \rightarrow c\bar{c}$	$h \rightarrow g\bar{g}$	$h \rightarrow \text{other}$	2f	4f	6f
Generated	128,701	6,058	19,044	69,605	3,890,180	13,514,000	346,419
$E_{\text{vis}}$	117,196	5,504	17,223	62,132	1,509,560	6,496,150	127,582
$P_T$	111,662	5,266	16,541	57,591	397,594	3,728,650	118,476
$P_Z$	111,350	5,247	16,490	57,494	360,477	3,516,270	117,336
$N_{\text{PFO}}$	110,995	5,212	16,473	40,567	198,131	2,337,060	104,438
$ \cos\theta_h $	103,857	4,872	15,533	38,800	49,689	1,847,580	92,833
$M_h$	63,883	3,467	9,132	6,895	2,901	93,094	12,839
Efficiency	49.6%	57.2%	48.0%	9.9%	0.1%	0.7%	3.7%

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(Cut Name ): all others SM evW bb cc gg WW ss
cut #0 (all ): 6.97e+09 3.86e+04 6.87e+09 9.47e+07 2.40e+05 1.10e+04 3.46e+04 8.89e+04 1.66e+02
cut #1 (ptvis>50. && ptvis<250. ): 5.05e+07 2.06e+04 3.32e+07 1.69e+07 1.72e+05 8.13e+03 2.56e+04 6.05e+04 1.24e+02
cut #2 (evis>100. && evis<400. ): 2.47e+07 1.76e+04 1.07e+07 1.38e+07 1.62e+05 7.73e+03 2.45e+04 5.35e+04 1.18e+02
cut #3 (MvisJETS>110. && MvisJETS<140. ): 1.28e+06 4.31e+03 8.37e+05 3.09e+05 9.81e+04 5.48e+03 1.51e+04 1.37e+04 8.48e+01
cut #4 (fabs(cjet1)<0.90 && fabs(cjet2)<0.90 ): 4.86e+05 3.24e+03 2.17e+05 1.67e+05 7.25e+04 4.08e+03 1.14e+04 1.10e+04 5.69e+01
cut #5 (bprob1>0.8 && bprob2>0.8 ): 4.20e+04 2.13e+02 1.16e+03 3.33e+03 3.71e+04 1.20e+01 1.26e+02 1.42e+01 0.00e+00
cut #6 (nTrks>15 ): 4.06e+04 2.10e+02 1.13e+03 3.14e+03 3.60e+04 1.20e+01 1.26e+02 1.42e+01 0.00e+00

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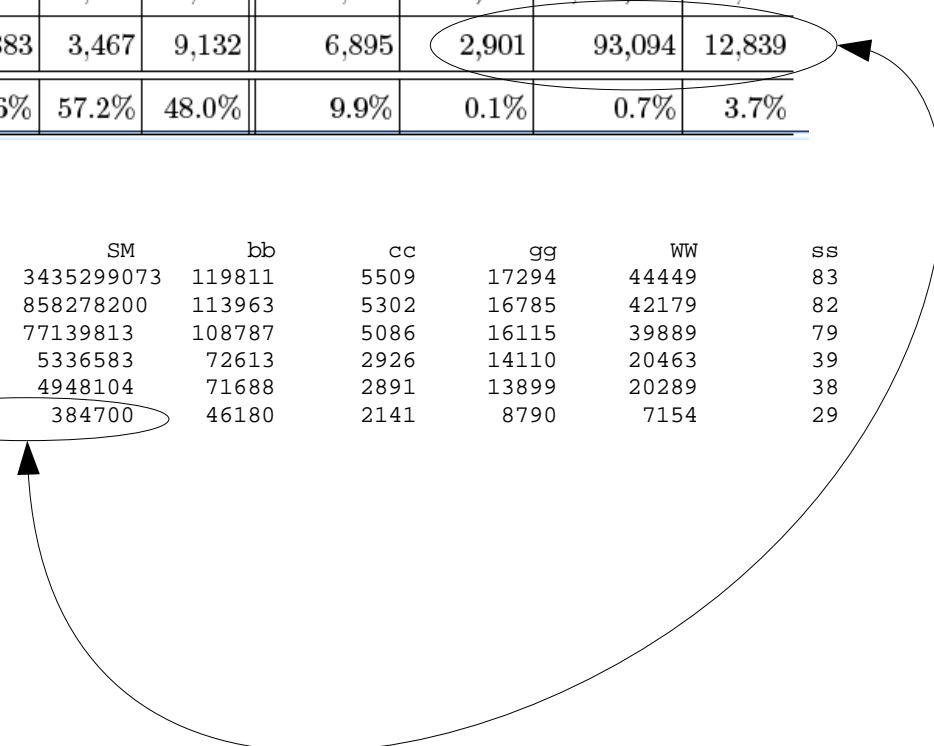
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cuts__ (Cut Name ): others evW SM bb cc gg WW ss
cut #0 (all ): 19279 47345721 3435299073 119811 5509 17294 44449 83
cut #1 (ptvis>50. && ptvis<250. ): 10304 8468763 16613826 85908 4064 12812 30270 62
cut #2 (evis>100. && evis<400. ): 8812 6875423 5332956 81224 3865 12258 26767 59
cut #3 (MvisJETS>110. && MvisJETS<140. ): 2157 154264 418441 49033 2742 7545 6873 42
cut #4 (fabs(cjet1)<0.90 && fabs(cjet2)<0.90 ): 1621 83264 108647 36239 2038 5709 5499 28
cut #5 (bprob1>0.8 && bprob2>0.8 ): 106 1666 580 18547 6 63 7 0
cut #6 (nTrks>15 ): 105 1568 567 17990 6 63 7 0

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Efficiency	49.6%	57.2%	48.0%	9.9%	0.1%	0.7%	3.7%

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cuts__ (Cut Name      ):  others    evW      SM      bb      cc      gg      WW      ss
cut #0 (all          ):  19279    47345721  3435299073  119811    5509    17294    44449    83
cut #1 (evis>40.  && evis<450. ):  17546    28565229  858278200  113963    5302    16785    42179    82
cut #2 (ptvis>20.   ):  15826    16875001  77139813   108787    5086    16115    39889    79
cut #3 (nTrks>20   ):  3013     4836928   5336583    72613    2926    14110    20463    39
cut #4 (fabs(cjet1)<0.98 && fabs(cjet2)<0.98 ):  2977     4703876   4948104    71688    2891    13899    20289    38
cut #5 (MvisJETS>110. && MvisJETS<150. ):  1167     144433    384700     46180    2141     8790     7154     29
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# Backgrounds

eexyev.eL.pR	15563.7
eeveyx.eL.pL	20690
vvxylv.eL.pR	21196.2
eexylv.eL.pR	23930.1
xxveyx.eL.pR	25645.1
vvvlyx.eL.pR	27198.3
eexyyx.eL.pL	38608.5
eexyyx.eL.pR	47731.4
4f_sznu_sl.eL.pR	51894.8
4f_sw_sl.eL.pR	128166

"a" is the symbol for a photon  
 "x" is the alias for an an up-type quark. i.e. and up quark or charm quark  
 "y" is the alias for a down-type quark, i.e. a down, stange or bottom quark

Process	Polarization	#events
higgs	-80/+20	1,544,398
<i>evW + eeZ + vvZ semileptonic</i>	-80/+20	6,570,292
all other SM background mix	-80/+20	3,232,672

Process	$\mathcal{L}$ ab <sup>-1</sup> per pol.	# Events (10 <sup>5</sup> ) P(e <sup>-</sup> /e <sup>+</sup> ) -0.8/+0.2
$e\gamma \rightarrow e\gamma$	$4 \cdot 10^{-5}$	0.5
$e^+e^- \rightarrow 2f, 4f$	0.034	3.7
$e\gamma \rightarrow 3f$	0.003	3.5
$e\gamma \rightarrow 5f$	0.25	3.1
$e^+e^- \rightarrow 6f$	1.0	1.8
$\Upsilon \rightarrow 2f$	0.001	5.7
$\Upsilon \rightarrow 4f$	0.083	2.5
$\Upsilon \rightarrow$ minijets:		
$4 < p_T < 40$ GeV	0.012	9.2
$p_T > 40$ GeV	0.105	2.3

Table from Tim Barklow

# Results from SiD Analysis for 500/fb

-80/+20

Table 1.8: Relative uncertainties on the Higgs  $\sigma \times BR$  expected for an integrated luminosity of  $1 \text{ ab}^{-1}$  at  $\sqrt{s} = 1 \text{ TeV}$  using the SiD detector.

$h \rightarrow$	#events	$\Delta(\sigma \times BR)$	For 500/fb
$b\bar{b}$	36013	$0.00556 \pm 0.00005$	0.0082
$c\bar{c}$	1392	$0.069 \pm 0.002$	0.10
$gg$	4708	$0.0319 \pm 0.0007$	0.044
$W^+W^-$	6178	$0.0362 \pm 0.0006$	0.063

+80/-20

PNNL data access issue