preparation for scenarios with eLpL, eLpR, eRpL, eRpR

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request to Higgs analysts

- ILC Parameter Group is preparing official ILC staging scenarios which will include running at different beam polarizations.
- most of the Higgs analyses done during DBD and Snowmass are for eLpR=(-0.8,+0.3); we need at least some results for eRpL=(+0.8,-0.3).
- in principle, cut optimization would be different at different polarizations cases due to different nature of background components; for the time being it would be good enough if only results with same cuts are available.
- further proposal to this request: provide additional results for eLpR=(-1,+1) and eRpL=(+1,-1), which can be very useful in the future (when people argue impact of beam polarizations); summarizing those information to one internal comprehensive document of Higgs analyses would be an interesting idea.
- I believe, with proper scripts, this request would be just piece of cake to experienced analyst; here I just give some example about what kind of information will be collected, and share my scripts which may be helpful.

$$e^+ + e^- \to \nu\bar{\nu}H \to \nu\bar{\nu}(b\bar{b})$$

Polarization: (e-,e+) = (-0.8,+0.3)

Reduction Table

Process	:	vvh(zh)	4f_sznu_sl	4f_sw_sl	4f_zz_sl	4f_ww_sl	6f_yyveev	6f_yyvllv	6f_yyvelv	4f_sze_sl	BG	Signal(vvbb)	Signf
Cross Section	:	20.4575	558.809	4853.29	366.125	5571.38	12.1054	47.1061	47.4037	1882.29	13359	149.421( )	
Generated	:	46395	47100	406600	41800	445000	4800	17000	17600	272900		188341( )	
Expected	:	10228.7	279404	2.42665e+06	183063	2.78569e+06	6052.68	23553.1	23701.8	941145	6.67948e+06	74710.3( )	16.6618
Cut0	:	9140.12	276285	722346	144380	1.42271e+06	1072.66	9323.12	6118.41	666979	3.25835e+06	67512.6(42780.5)	23.4581
Cut1	:	7839.12	234259	228436	102172	653997	930.943	8008.86	5450	65011.3	1.3061e+06	59697.7(40932.8)	35.0249
Cut2	:	7300.93	203489	135164	60683.7	287428	305.753	4272.14	2424.89	1311.02	702379	54529.4(37682.8)	43.3133
Cut3	:	7223.98	202977	121791	59865.4	250944	104.105	2813.42	1115.72	1259.25	648094	54047.5(37370.4)	44.598
Cut4	:	4862.76	44943.2	1494.73	13035.9	3851.21	96.6099	2556.44	997.378	91.141	71929.4	35598.1(34744.4)	105.956
Cut5	:	1950.84	39125	910.811	5735.64	1145.37	87.3916	2382.61	906.999	40.7103	52285.4	34278.1(33460.6)	113.728
Cut6	:	1512.4	3956.93	132.532	461.126	176.462	20.3907	673.798	237.282	5.51405	7176.44	29199.3(28598.1)	149.945

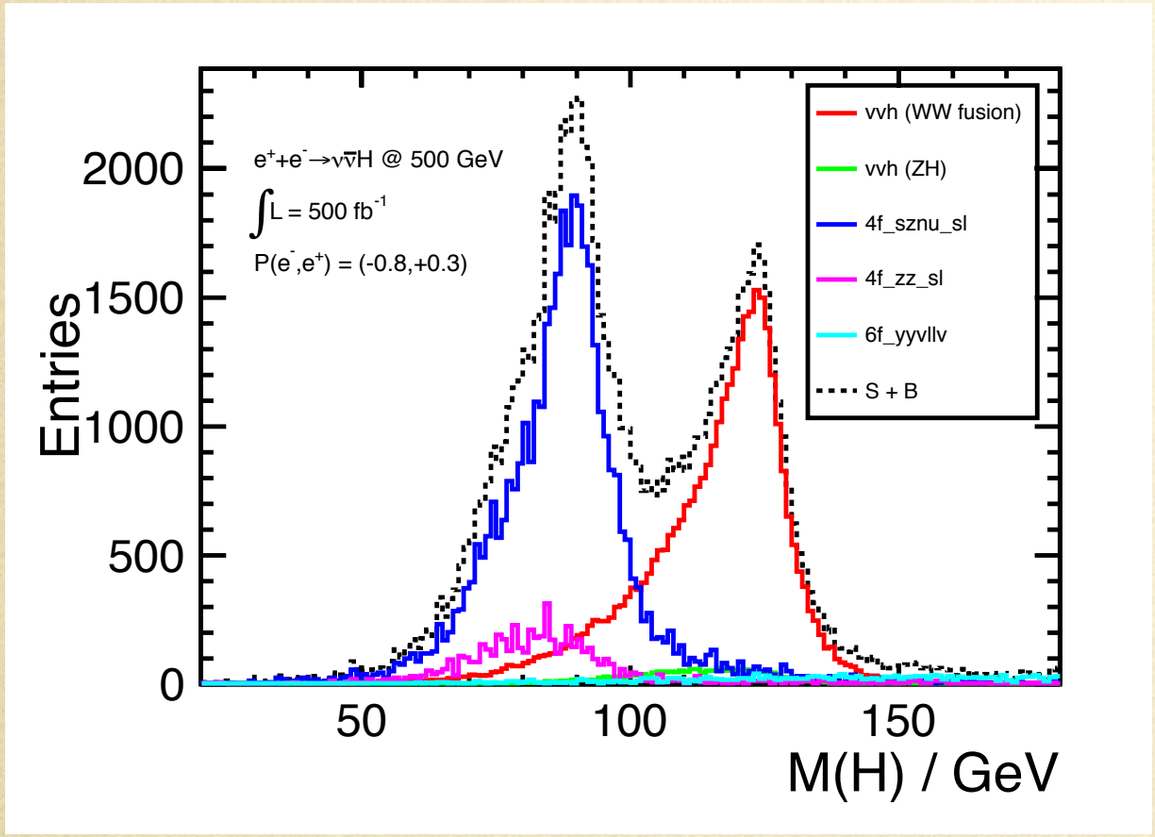
Polarization: (e-,e+) = (+0.8,-0.3)

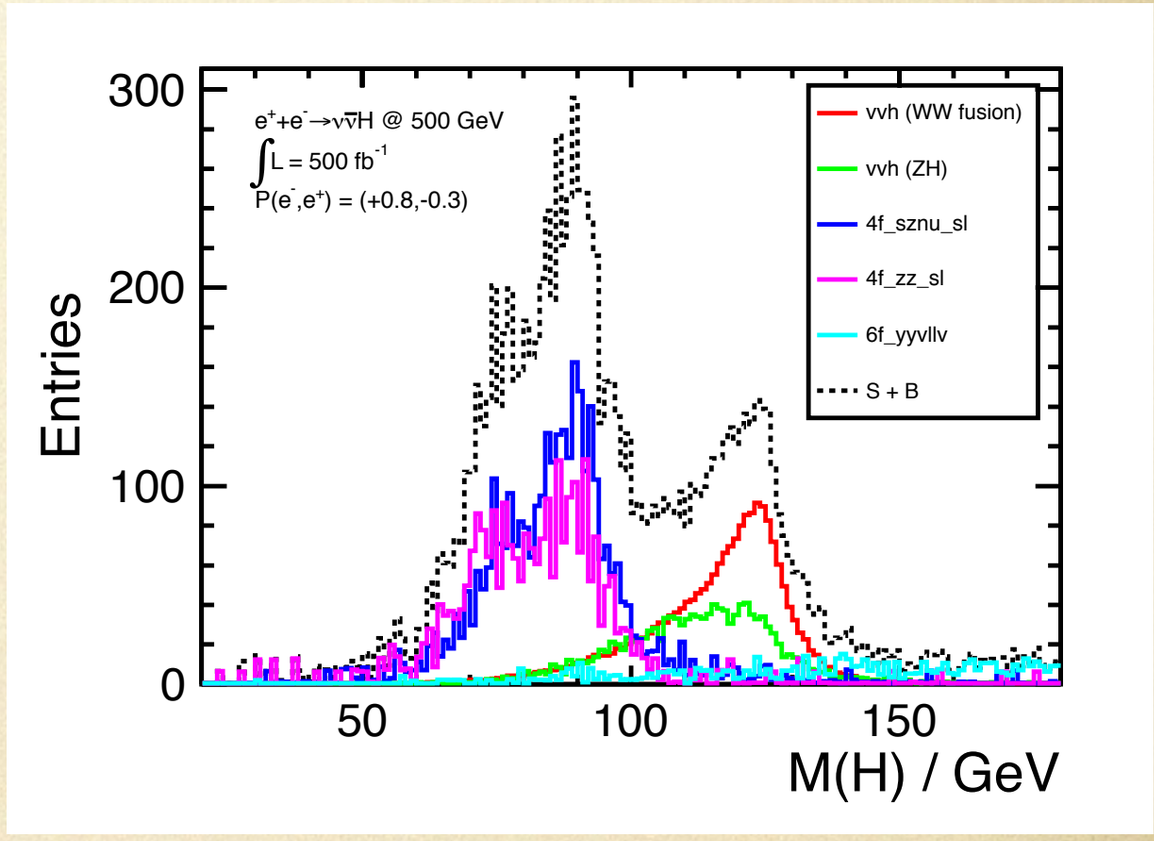
Reduction Table

Process	:	vvh(zh)	4f_sznu_sl	4f_sw_sl	4f_zz_sl	4f_ww_sl	6f_yyveev	6f_yyvllv	6f_yyvelv	4f_sze_sl	BG	Signal(vvbb)	Signf
Cross Section	:	13.7914	67.8128	571.799	190.015	359.899	5.17396	20.3871	20.4375	1753.79	3003.11	8.93969( )	
Generated	:	46395	47100	406600	41800	445000	4800	17000	17600	272900		188341( )	
Expected	:	6895.7	33906.4	285899	95007.5	179950	2586.98	10193.6	10218.7	876895	1.50155e+06	4469.85( )	2.11108
Cut0	:	6167.52	33468.1	134443	74624.5	91453.5	261.692	3404.31	1877.34	641394	987094	4039.22(2559.52)	2.57094
Cut1	:	5272.15	27503.4	45315.3	50406.8	41845.3	220.746	2824.78	1571.78	57660.5	232621	3571.66(2448.97)	5.03907
Cut2	:	4898.08	23691.8	31224.1	28374	19008.1	64.9069	1537.75	669.062	1333.67	110801	3262.44(2254.53)	6.67546
Cut3	:	4840.72	23618.2	29619.7	28001.2	16620	15.7092	975.741	257.518	1292.18	105241	3233.61(2235.84)	6.78854
Cut4	:	3249.18	5015.68	379.041	5953.98	266.645	15.079	889.343	236.236	122.045	16127.2	2129.8(2078.73)	15.3845
Cut5	:	1322.17	3316.95	249.385	2734.06	80.6034	14.5274	821.003	219.849	52.548	8811.09	2050.83(2001.92)	19.2085
Cut6	:	1000.11	310.411	27.52	164.567	16.596	3.05781	225.346	47.2412	1.13782	1795.99	1746.97(1711)	28.7453

with re-optimized cuts: 28.7σ —> 30.7σ

$$e^+ + e^- \to \nu\bar{\nu}H \to \nu\bar{\nu}(b\bar{b})$$





significant degradation on measurements with WW-fusion process; also worth noting the relative contamination from ZH (green)

with additional 10s…

Polarization: (e-,e+) = (-1.,+1.)

Reduction Table

Process	:	vvh(zh)	4f_sznu_sl	4f_sw_sl	4f_zz_sl	4f_ww_sl	6f_yyveev	6f_yyvllv	6f_yyvelv	4f_sze_sl	BG	Signal(vvbb)	Signf
Cross Section	:	33.6802	951.7	7806	608.6	9521	20.17	78.72	79.11	1961	21060	255.42( )	
Generated	:	46395	47100	406600	41800	445000	4800	17000	17600	272900		188341( )	
Expected	:	16840.1	475850	3.903e+06	304300	4.7605e+06	10085	39360	39555	980500	1.053e+07	127710( )	22.6736
Cut0	:	15047.2	470544	1.06786e+06	240031	2.43133e+06	1805.85	15644.8	10277.9	677523	4.93006e+06	115406(73129)	32.5566
Cut1	:	12907.2	399059	332702	170107	1.11766e+06	1572.63	13449.6	9177.4	67785.7	2.12442e+06	102047(69970.6)	46.8929
Cut2	:	12022.3	346662	188315	101193	491144	516.856	7171.2	4083.1	1268.63	1.15238e+06	93212.7(64415.1)	57.7165
Cut3	:	11896.2	345791	166905	99827.6	428800	176.487	4726.4	1882.05	1214.87	1.06122e+06	92388.8(63881.1)	59.4761
Cut4	:	8008.78	76587.1	2012.85	21752.6	6579.55	163.881	4294.4	1684.28	86.0088	121170	60851.4(59392.2)	139.209
Cut5	:	3211.04	66780.1	1194.8	9559.11	1956.66	148.123	4003.2	1531.16	32.2533	88416.5	58595.1(57197.6)	149.177
Cut6	:	2491.94	6756.43	182.987	774.191	301.025	34.6672	1132.8	401.93	0	12076	49913.3(48885.7)	196.347

Polarization: (e-,e+) = (+1.,-1.)

Reduction Table

Process	:	vvh(zh)	4f_sznu_sl	4f_sw_sl	4f_zz_sl	4f_ww_sl	6f_yyveev	6f_yyvllv	6f_yyvelv	4f_sze_sl	BG	Signal(vvbb)	Signf
Cross Section	:	21.56	58.98	22.83	288.4	45.58	7.567	30.14	30.08	1726	2231.14	0( )	
Generated	:	46395	47100	406600	41800	445000	4800	17000	17600	272900		188341( )	
Expected	:	10780	29490	11415	144200	22790	3783.5	15070	15040	863000	1.11557e+06	0( )	0
Cut0	:	9642.5	29058.2	1276.4	113202	10866.7	331.056	4883.32	2569.33	629453	801282	0(0)	0
Cut1	:	8240	23139.1	508.486	75988.1	4661.59	280.61	4024.01	2127.53	54875.2	173845	0(0)	0
Cut2	:	7653.5	19758.3	269.809	42448.2	3107.73	78.8229	2199.58	893	1332.65	77741.6	0(0)	0
Cut3	:	7563	19684.6	217.923	41892.8	2755.52	15.7646	1385.16	322.733	1289.66	75127.1	0(0)	0
Cut4	:	5075	3991.68	0	8876.31	62.1545	15.7646	1263.31	300.8	118.219	19703.2	0(0)	0
Cut5	:	2068	1674.61	0	4101.69	20.7182	15.7646	1163.92	282	53.736	9380.44	0(0)	0
Cut6	:	1560.5	126.386	0	234.993	10.3591	3.15292	317.432	56.4	0	2309.22	0(0)	0

summary

- ideally four reduction tables for (-0.8,+0.3), (+0.8,-0.3), (-1,+1) and (+1,-1) should be provided for each mode of each analysis.

- it would be not very trivial to do with template fitting and recoil mass fitting; but still reduction table before fitting would be very useful.

- example script: login.cc.kek.jp:/home/ilc/tianjp/analysis/Snowmass/vvh2j/run/final/cut_vvh.C; feel free to modify it for your analysis.

- not sure about schedule of this request, but before final results are available, preliminary results would be very welcome, you can keep me updated with newer results (I would be very glad to do bookkeeping for you).