Miss calculation

Calculation of Xsec(initial settings) of qqH(H->bb) was not correct. I modified it.

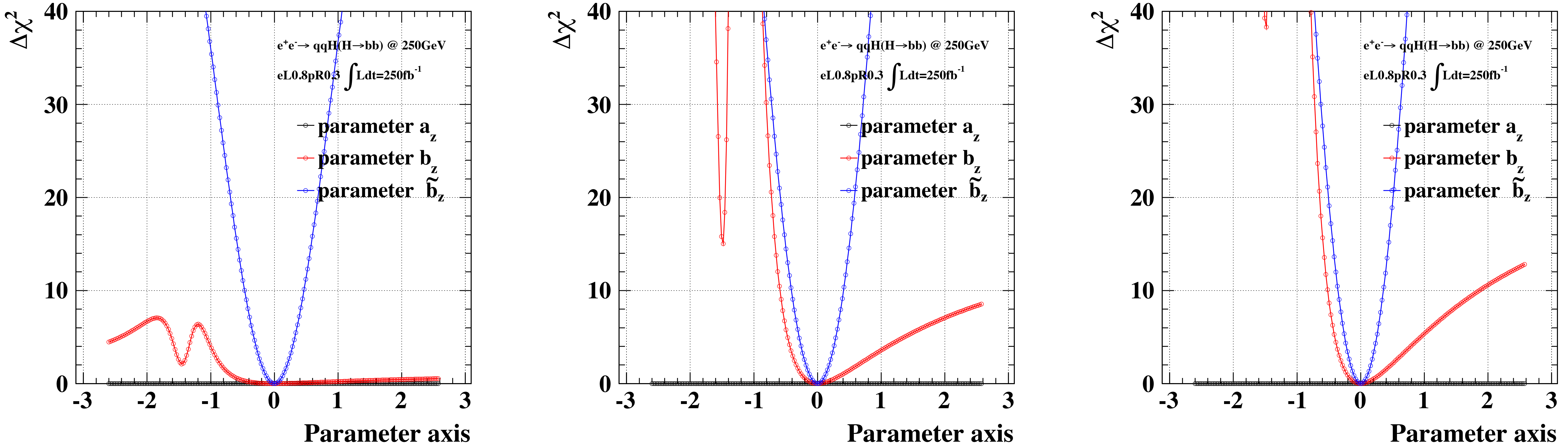
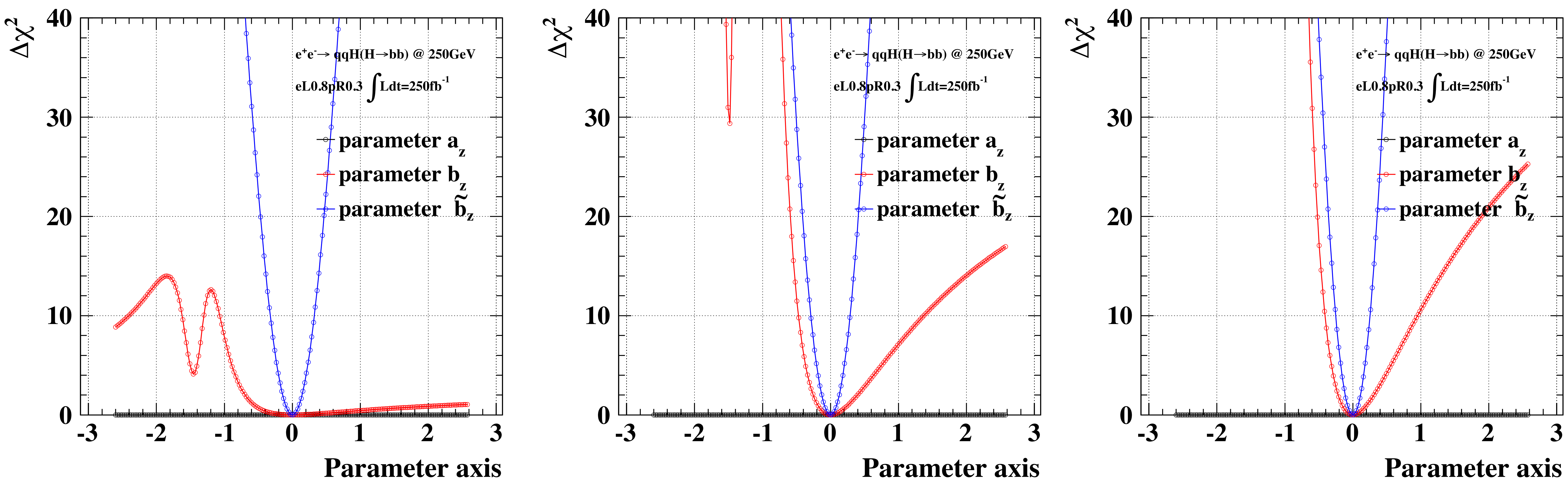


Figure 68: ssssssss.

modified ones



MIGRAD, HESSE and MINOS

MIGRAD parabolic error.
HESSE should be used
for improved results.
MINOS asym. error.

```
 double step [3]={0.01, 0.01, 0.01}; // default

 double boundLimInit=2;

 arglist[0] = 1;
 aMinuit->mnexcm("SET STR", arglist, 1,ierflg);


// ----- now ready for minimization step
arglist[0] = 1.0E+06;
arglist[1] = 0.01;

aMinuit->mnexcm("MIGRAD",  arglist ,2, ierflg);
PrintError(aMinuit);
aMinuit->mnexcm("HESSE",  arglist ,2, ierflg);
PrintError(aMinuit);
aMinuit->mnexcm("MINOS",  arglist ,2, ierflg);
PrintError(aMinuit);
//aMinuit->mnexcm("IMPROVE", arglist ,2, ierflg);
cerr << "-------------------------\n\n\n" << endl;

aMinuit->SetErrorDef(4);

aMinuit->mnexcm("MIGRAD",  arglist ,2, ierflg);
PrintError(aMinuit);
aMinuit->mnexcm("HESSE",  arglist ,2, ierflg);
PrintError(aMinuit);
aMinuit->mnexcm("MINOS",  arglist ,2, ierflg);
PrintError(aMinuit);
//aMinuit->mnexcm("IMPROVE", arglist ,2, ierflg);
```

250GeV 250fb^{-1}

1sigma

			LR		RL	
mmH (3d)	MIGRAD		a ------->0 parameter: 0.00000 +/- 0.99847 b ------->1 parameter: 0.00000 +/- 0.37360 bt ------->2 parameter: 0.00000 +/- 0.15488		------->0 parameter: 0.00000 +/- 0.76728 ------->1 parameter: 0.00000 +/- 0.28221 ------->2 parameter: 0.00000 +/- 0.18743	
	HESSE	N~1620 Signif= 31.83	ERR MATRIX NOT POS-DEF ------->0 parameter: 0.00000 +/- 0.78283 ------->1 parameter: 0.00000 +/- 0.28844 ------->2 parameter: 0.00000 +/- 0.15471	N~1150 Signif= 27.29	------->0 parameter: 0.00000 +/- 0.48214 ------->1 parameter: 0.00000 +/- 0.17600 ------->2 parameter: 0.00000 +/- 0.19267	
	MINOS		------->0 parameter: 0.00000 +/- 1.09507 ------->1 parameter: 0.00000 +/- 0.41361 ------->2 parameter: 0.00000 +/- 0.15489		------->0 parameter: 0.00000 +/- 0.48214 ------->1 parameter: 0.00000 +/- 0.17600 ------->2 parameter: 0.00000 +/- 0.19267	
eeH (3d)	MIGRAD		------->0 parameter: 0.00000 +/- 1.01453 ------->1 parameter: 0.00000 +/- 0.38064 ------->2 parameter: 0.00000 +/- 0.16676		------->0 parameter: 0.00000 +/- 1.17906 ------->1 parameter: 0.00000 +/- 0.45001 ------->2 parameter: 0.00000 +/- 0.20823	
	HESSE	N~1530. Signif= 28	------->0 parameter: 0.00000 +/- 0.26043 ------->1 parameter: 0.00000 +/- 0.09470 ------->2 parameter: 0.00000 +/- 0.16669	N~990 Signif= 22	------->0 parameter: 0.00000 +/- 0.21052 ------->1 parameter: 0.00000 +/- 0.07573 ------->2 parameter: 0.00000 +/- 0.21039	
	MINOS		------->0 parameter: 0.00000 +/- 0.26043 ------->1 parameter: 0.00000 +/- 0.09470 ------->2 parameter: 0.00000 +/- 0.16669		------->0 parameter: 0.00000 +/- 0.21052 ------->1 parameter: 0.00000 +/- 0.07573 ------->2 parameter: 0.00000 +/- 0.21039	
qqH (3d)	MIGRAD	N~ 9900. Signif= 72.43	------->0 parameter: 0.00000 +/- 0.46459 ------->1 parameter: 0.00000 +/- 0.16882 ------->2 parameter: 0.00000 +/- 0.07960	N~7600 Signif= 65.28	------->0 parameter: 0.00000 +/- 0.52517 ------->1 parameter: 0.00000 +/- 0.19126 ------->2 parameter: 0.00000 +/- 0.08440	
	HESSE		------->0 parameter: 0.00000 +/- 0.24178 ------->1 parameter: 0.00000 +/- 0.08786 ------->2 parameter: 0.00000 +/- 0.07993		------->0 parameter: 0.00000 +/- 0.45503 ------->1 parameter: 0.00000 +/- 0.16569 ------->2 parameter: 0.00000 +/- 0.08365	
	MINOS		------->0 parameter: 0.00000 +/- 0.24178 ------->1 parameter: 0.00000 +/- 0.08786 ------->2 parameter: 0.00000 +/- 0.07993		------->0 parameter: 0.00000 +/- 0.45503 ------->1 parameter: 0.00000 +/- 0.16569 ------->2 parameter: 0.00000 +/- 0.08365	

a and b are strongly correlated (correlation is close to 1), HESSE has sometimes trouble and has error .

Estimation of Error of “bt” is alway stable.

qqH seems to return relatively stable error.

Extrapolation using qqH ΔX/sqrt(1800/250) : a ~ 0.17 b ~ 0.06 bt~ 0.03 (MIGRAD)
a ~ 0.09 b ~ 0.03 bt~ 0.03 (HESSE) twice difference

250GeV 250fb^{-1}

2sigma

		LR	RL
mmH (3d)	MIGRAD	------->0 parameter: 0.00000 +/- 2.91634 ------->1 parameter: 0.00000 +/- 0.80934 ------->2 parameter: 0.00000 +/- 0.30885	------->0 parameter: 0.00000 +/- 0.93584 ------->1 parameter: 0.00000 +/- 0.35064 ------->2 parameter: 0.00000 +/- 0.38355
	HESSE	------->0 parameter: 0.00000 +/- 1.60901 ------->1 parameter: 0.00000 +/- 0.65963 ------->2 parameter: 0.00000 +/- 0.30887	------->0 parameter: 0.00000 +/- 2.93462 ------->1 parameter: 0.00000 +/- 0.84143 ------->2 parameter: 0.00000 +/- 0.37326
	MINOS	------->0 parameter: 0.00000 +/- 1.60901 ------->1 parameter: 0.00000 +/- 0.65963 ------->2 parameter: 0.00000 +/- 0.30887	------->0 parameter: 0.00000 +/- 2.93462 ------->1 parameter: 0.00000 +/- 0.84143 ------->2 parameter: 0.00000 +/- 0.37326
eeH (3d)	MIGRAD	------->0 parameter: 0.00000 +/- 0.51643 ------->1 parameter: 0.00000 +/- 0.18919 ------->2 parameter: 0.00000 +/- 0.33221	------->0 parameter: 0.00000 +/- 0.41871 ------->1 parameter: 0.00000 +/- 0.15135 ------->2 parameter: 0.00000 +/- 0.41844
	HESSE	------->0 parameter: 0.00000 +/- 1.58270 ------->1 parameter: 0.00000 +/- 0.64571 ------->2 parameter: 0.00000 +/- 0.33234	------->0 parameter: 0.00000 +/- 1.62500 ------->1 parameter: 0.00000 +/- 0.67007 ------->2 parameter: 0.00000 +/- 0.41415
	MINOS	------->0 parameter: 0.00000 +/- 1.58270 ------->1 parameter: 0.00000 +/- 0.64571 ------->2 parameter: 0.00000 +/- 0.33234	------->0 parameter: 0.00000 +/- 1.62500 ------->1 parameter: 0.00000 +/- 0.67007 ------->2 parameter: 0.00000 +/- 0.41415
qqH (3d)	MIGRAD	------->0 parameter: 0.00000 +/- 0.48001 ------->1 parameter: 0.00000 +/- 0.17555 ------->2 parameter: 0.00000 +/- 0.15972	------->0 parameter: 0.00000 +/- 0.88619 ------->1 parameter: 0.00000 +/- 0.33023 ------->2 parameter: 0.00000 +/- 0.16715
	HESSE	------->0 parameter: 0.00000 +/- 0.21380 ------->1 parameter: 0.00000 +/- 0.08632 ------->2 parameter: 0.00000 +/- 0.16240	------->0 parameter: 0.00000 +/- 1.43679 ------->1 parameter: 0.00000 +/- 0.56026 ------->2 parameter: 0.00000 +/- 0.21275
	MINOS	------->0 parameter: 0.00000 +/- 0.21380 ------->1 parameter: 0.00000 +/- 0.08632 ------->2 parameter: 0.00000 +/- 0.16240	------->0 parameter: 0.00000 +/- 1.07373 ------->1 parameter: 0.00000 +/- 0.40569 ------->2 parameter: 0.00000 +/- 0.16815

250GeV 250fb^{-1} 4 processes

```
double step [3]={0.01, 0.01, 0.01}; // default
double boundLimInit=2;
```

1sigma	LR	RL	combine
MIGRAD	------->0 parameter: 0+/- 0.406572 ------->1 parameter: 0+/- 0.146094 ------->2 parameter: 0+/- 0.0648613	------->0 parameter: 0+/- 0.40493 ------->1 parameter: 0+/- 0.145654 ------->2 parameter: 0+/- 0.0716879	------->0 parameter: 0 +/- 0.297951 ------->1 parameter: 0 +/- 0.106033 ------->2 parameter: 0 +/- 0.0480538
HESSE	------->0 parameter: 0+/- 0.246849 ------->1 parameter: 0+/- 0.0874277 ------->2 parameter: 0+/- 0.0646963	------->0 parameter: 0+/- 0.199229 ------->1 parameter: 0+/- 0.0729634 ------->2 parameter: 0+/- 0.0717017	------->0 parameter: 0 +/- 0.311821 ------->1 parameter: 0 +/- 0.110866 ------->2 parameter: 0 +/- 0.0473276
MINOS	------->0 parameter: 0+/- 0.246849 ------->1 parameter: 0+/- 0.0874277 ------->2 parameter: 0+/- 0.0646963	------->0 parameter: 0+/- 0.199229 ------->1 parameter: 0+/- 0.0729634 ------->2 parameter: 0+/- 0.0717017	------->0 parameter: 0 +/- 0.311821 ------->1 parameter: 0 +/- 0.110866 ------->2 parameter: 0 +/- 0.0473276

Estimation of Error of “bt” is alway stable.
Red seems to be reasonable as a combine
Blue has some trouble

0.24 / sqrt(2) = 0.16
0.08 / sqrt(2) = 0.056
0.065 / sqrt(2) = 0.045

2sigma

MIGRAD	------->0 parameter: 0+/- 0.489923 ------->1 parameter: 0+/- 0.174688 ------->2 parameter: 0+/- 0.129325	------->0 parameter: 0+/- 0.396476 ------->1 parameter: 0+/- 0.14583 ------->2 parameter: 0+/- 0.143311	------->0 parameter: 0 +/- 0.616016 ------->1 parameter: 0 +/- 0.221391 ------->2 parameter: 0 +/- 0.0946287
HESSE	------->0 parameter: 0+/- 0.783742 ------->1 parameter: 0+/- 0.286497 ------->2 parameter: 0+/- 0.129545	------->0 parameter: 0+/- 0.880623 ------->1 parameter: 0+/- 0.32478 ------->2 parameter: 0+/- 0.143297	------->0 parameter: 0 +/- 0.579857 ------->1 parameter: 0 +/- 0.208352 ------->2 parameter: 0 +/- 0.0961559
MINOS	------->0 parameter: 0+/- 0.783742 ------->1 parameter: 0+/- 0.286497 ------->2 parameter: 0+/- 0.129545	------->0 parameter: 0+/- 0.880623 ------->1 parameter: 0+/- 0.32478 ------->2 parameter: 0+/- 0.143297	------->0 parameter: 0 +/- 0.579857 ------->1 parameter: 0 +/- 0.208352 ------->2 parameter: 0 +/- 0.0961559

250GeV 250fb^{-1} combine

```
double step [3]={0.01, 0.01, 0.01}; // default
double boundLimInit=2;
```

```
double step [3]={0.001, 0.001, 0.001}; // default
double boundLimInit=2;
```

```
double step [3]={0.0001, 0.0001, 0.0001}; // d
```

1sigma

MIGRAD	------->0 parameter: 0 +/- 0.297951	------->0 parameter: 0 +/- 0.293437	------->0 parameter: 0 +/- 0.288708
	------->1 parameter: 0 +/- 0.106033	------->1 parameter: 0 +/- 0.104417	------->1 parameter: 0 +/- 0.102699
	------->2 parameter: 0 +/- 0.0480538	------->2 parameter: 0 +/- 0.0480658	------->2 parameter: 0 +/- 0.0480281
HESSE	------->0 parameter: 0 +/- 0.311821	------->0 parameter: 0 +/- 0.307605	------->0 parameter: 0 +/- 0.301152
	------->1 parameter: 0 +/- 0.110866	------->1 parameter: 0 +/- 0.109352	------->1 parameter: 0 +/- 0.107186
	------->2 parameter: 0 +/- 0.0473276	------->2 parameter: 0 +/- 0.047312	------->2 parameter: 0 +/- 0.0480772
MINOS	------->0 parameter: 0 +/- 0.311821	------->0 parameter: 0 +/- 0.307605	------->0 parameter: 0 +/- 0.301152
	------->1 parameter: 0 +/- 0.110866	------->1 parameter: 0 +/- 0.109352	------->1 parameter: 0 +/- 0.107186
	------->2 parameter: 0 +/- 0.0473276	------->2 parameter: 0 +/- 0.047312	------->2 parameter: 0 +/- 0.0480772

2sigma

------->0 parameter: 0 +/- 0.616016	------->0 parameter: 0 +/- 0.607889	------->0 parameter: 0 +/- 0.595437
------->1 parameter: 0 +/- 0.221391	------->1 parameter: 0 +/- 0.218377	------->1 parameter: 0 +/- 0.214064
------->2 parameter: 0 +/- 0.0946287	------->2 parameter: 0 +/- 0.0945975	------->2 parameter: 0 +/- 0.0961265
------->0 parameter: 0 +/- 0.579857	------->0 parameter: 0 +/- 0.600745	------->0 parameter: 0 +/- 0.579113
------->1 parameter: 0 +/- 0.208352	------->1 parameter: 0 +/- 0.216031	------->1 parameter: 0 +/- 0.208038
------->2 parameter: 0 +/- 0.0961559	------->2 parameter: 0 +/- 0.0961387	------->2 parameter: 0 +/- 0.0961243
------->0 parameter: 0 +/- 0.579857	------->0 parameter: 0 +/- 0.600745	------->0 parameter: 0 +/- 0.579113
------->1 parameter: 0 +/- 0.208352	------->1 parameter: 0 +/- 0.216031	------->1 parameter: 0 +/- 0.208038
------->2 parameter: 0 +/- 0.0961559	------->2 parameter: 0 +/- 0.0961387	------->2 parameter: 0 +/- 0.0961243

A step size does not change the error

250GeV H20 combine

```
double step [3]={0.01, 0.01, 0.01}; // default
double boundLimInit=2;
```

```
double step [3]={0.001, 0.001, 0.001}; // default
double boundLimInit=2;
```

```
double step [3]={0.0001, 0.0001, 0.0001}; // default
```

```
double step [3]={0.00001, 0.00001, 0.
```

1sigma

MIGRAD	------->0 parameter: 0 +/- 0.143993 ------->1 parameter: 0 +/- 0.0513552 ------->2 parameter: 0 +/- 0.0246984	------->0 parameter: 0 +/- 0.174259 ------->1 parameter: 0 +/- 0.0621539 ------->2 parameter: 0 +/- 0.0246514	------->0 parameter: 0 +/- 0.136792 ------->1 parameter: 0 +/- 0.0487256 ------->2 parameter: 0 +/- 0.0246567	------->0 parameter: 0 +/- 0.0742048 ------->1 parameter: 0 +/- 0.02676 ------->2 parameter: 0 +/- 0.02418
HESSE	------->0 parameter: 0 +/- 0.0796666 ------->1 parameter: 0 +/- 0.0280893 ------->2 parameter: 0 +/- 0.0247283	------->0 parameter: 0 +/- 0.0918565 ------->1 parameter: 0 +/- 0.0326159 ------->2 parameter: 0 +/- 0.0246169	------->0 parameter: 0 +/- 0.105907 ------->1 parameter: 0 +/- 0.0376633 ------->2 parameter: 0 +/- 0.0246247	------->0 parameter: 0 +/- 0.154321 ------->1 parameter: 0 +/- 0.055042 ------->2 parameter: 0 +/- 0.0247228
MINOS	------->0 parameter: 0 +/- 0.0796666 ------->1 parameter: 0 +/- 0.0280893 ------->2 parameter: 0 +/- 0.0247283	------->0 parameter: 0 +/- 0.0918565 ------->1 parameter: 0 +/- 0.0326159 ------->2 parameter: 0 +/- 0.0246169	------->0 parameter: 0 +/- 0.105907 ------->1 parameter: 0 +/- 0.0376633 ------->2 parameter: 0 +/- 0.0246247	------->0 parameter: 0 +/- 0.154321 ------->1 parameter: 0 +/- 0.055042 ------->2 parameter: 0 +/- 0.0247228

2sigma

------->0 parameter: 0 +/- 0.159207 ------->1 parameter: 0 +/- 0.056173 ------->2 parameter: 0 +/- 0.0494527	------->0 parameter: 0 +/- 0.183519 ------->1 parameter: 0 +/- 0.0652231 ------->2 parameter: 0 +/- 0.0492301	------->0 parameter: 0 +/- 0.211516 ------->1 parameter: 0 +/- 0.0753133 ------->2 parameter: 0 +/- 0.0492456	------->0 parameter: 0 +/- 0.307721 ------->1 parameter: 0 +/- 0.110042 ------->2 parameter: 0 +/- 0.0494419
------->0 parameter: 0 +/- 0.140365 ------->1 parameter: 0 +/- 0.049002 ------->2 parameter: 0 +/- 0.0495913	------->0 parameter: 0 +/- 0.00287702 ------->1 parameter: 0 +/- 0.00297206 ------->2 parameter: 0 +/- 0.0497715	------->0 parameter: 0 +/- 0.00133617 ------->1 parameter: 0 +/- 0.000548164 ------->2 parameter: 0 +/- 0.0495267	------->0 parameter: 0 +/- 0.00860789 ------->1 parameter: 0 +/- 0.00576989 ------->2 parameter: 0 +/- 0.0498416
------->0 parameter: 0 +/- 0.140365 ------->1 parameter: 0 +/- 0.049002 ------->2 parameter: 0 +/- 0.0495913	------->0 parameter: 0 +/- 0.00287702 ------->1 parameter: 0 +/- 0.00297206 ------->2 parameter: 0 +/- 0.0497715	------->0 parameter: 0 +/- 0.00133617 ------->1 parameter: 0 +/- 0.000548164 ------->2 parameter: 0 +/- 0.0495267	------->0 parameter: 0 +/- 0.00860789 ------->1 parameter: 0 +/- 0.00576989 ------->2 parameter: 0 +/- 0.0498416

Estimation of Error of “bt” is alway stable.
A too small step size gives inconsistent errors.
MiGRAD gives near errors for 1 and 2 sigma.

250GeV 250fb^{-1} combine

```
// 2 try to improve minimum (slower)
  arglist[0] = 2;

  aMinuit->mnexcm("SET STR", arglist, 1,ierflg);
```

1sigma

	LR	RL	combine
MIGRAD	------->0 parameter: 0 +/- 0.431051 ------->1 parameter: 0 +/- 0.154772 ------->2 parameter: 0 +/- 0.0648254	------->0 parameter: 0 +/- 0.447976 ------->1 parameter: 0 +/- 0.161439 ------->2 parameter: 0 +/- 0.0717449	------->0 parameter: 0 +/- 0.294431 ------->1 parameter: 0 +/- 0.104518 ------->2 parameter: 0 +/- 0.04811
HESSE	------->0 parameter: 0 +/- 0.412781 ------->1 parameter: 0 +/- 0.148369 ------->2 parameter: 0 +/- 0.0647502	------->0 parameter: 0 +/- 0.447828 ------->1 parameter: 0 +/- 0.161385 ------->2 parameter: 0 +/- 0.0716997	------->0 parameter: 0 +/- 0.301062 ------->1 parameter: 0 +/- 0.107156 ------->2 parameter: 0 +/- 0.0480769

2sigma

MIGRAD	------->0 parameter: 0 +/- 0.59461 ------->1 parameter: 0 +/- 0.214968 ------->2 parameter: 0 +/- 0.129549	------->0 parameter: 0 +/- 0.851668 ------->1 parameter: 0 +/- 0.313385 ------->2 parameter: 0 +/- 0.143333	------->0 parameter: 0 +/- 0.586946 ------->1 parameter: 0 +/- 0.210927 ------->2 parameter: 0 +/- 0.0961299
HESSE	------->0 parameter: 0 +/- 0.83364 ------->1 parameter: 0 +/- 0.305929 ------->2 parameter: 0 +/- 0.129247	------->0 parameter: 0 +/- 0.894932 ------->1 parameter: 0 +/- 0.33024 ------->2 parameter: 0 +/- 0.142988	------->0 parameter: 0 +/- 0.577809 ------->1 parameter: 0 +/- 0.207475 ------->2 parameter: 0 +/- 0.0959255

HESSE gives me consistent errors

250GeV H20 combine

```
// 2 try to improve minimum (slower)
  arglist[0] = 2;

  aMinuit->mnexcm("SET STR", arglist, 1,ierflg);
```

1sigma

MIGRAD

------->0 parameter: 0 +/- 0.154475
------->1 parameter: 0 +/- 0.0550985
------->2 parameter: 0 +/- 0.0247538

HESSE

------->0 parameter: 0 +/- 0.154228
------->1 parameter: 0 +/- 0.05501
------->2 parameter: 0 +/- 0.0247242

2sigma

MIGRAD

------->0 parameter: 0 +/- 0.0096952
------->1 parameter: 0 +/- 0.0040211
------->2 parameter: 0 +/- 0.0475766

HESSE

------->0 parameter: 0 +/- 0.31127
------->1 parameter: 0 +/- 0.111322
------->2 parameter: 0 +/- 0.0494437

HESSE gives me consistent errors