The Return of the *ILC-XSEC-DB*

C. Calancha (KEK)
calancha@post.kek.jp

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Introduction

What is ilc-xsec-db

- A database with the cross sections of all ILC official samples.
  - Here official means those samples generated in mass production.
  - Contains DBD samples and post-DBD.

Design requirements

- Easy to use, easy to keep updated (*).
- Run on kekcc without requiring special privileges.
- To be used in interactive session.
- To be reasonable fast.
- Scalability.
- Provide expected number of events under user input conditions (int lum., beam pol)

(*) I could train one student in a short time to be in charge on this duty.

Good For All People

Good For Students

- Useful tool once you just started one analysis.
- Collect the cross sections for all samples that you are considering.

Good for Senior Researchers

- Get the expected number of signal/background events in one decay channel at the target beam pol. int lum.
- According with the estimated sensitivity decide the channel you want to assign to your new student.

Before/After ilc-xsec-db (More Propaganda...)

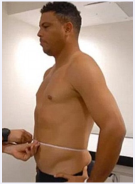
Before

- Any analysist collect cross sections.
- Duplication of efforts.
- Time consumming.
- No error free.

- (I decided start my diet writting this slide)

After

- Fast and easy access to cross sections of all official samples.
- Values collected from original official sources by script.



Room for Improvements

ilc-xsec-db still can be better

- ilc-xsec-db already amazing as it is, but...
- We should get the software that we deserve!
- I decided to take a look again on this tool.

From ilc-xsec-db-2.0 To ilc-xsec-db-2.1

Before

- Arguments with options requires option being a single value (e.g. –type=nnh_zz).
- That is options being lists (e.g. –type=[nnh_zz,nnh_mumu]) is not supported.
- Core written on `LISP`, lists options should be ok.
- Workaround using loops unecessarily complicated.

After

- Rewrote several parts of the app.
  - Perform some missing input checks.
  - Improve logicall structure of the code.
- Added support for arguments with options being lists!

Backward compatibility

- 100%: Same syntasix, same arguments as previous version.

Performance Check

- I have tested the new funcionality.
- New way: Called the application providing several lists arguments.
- Old way: Calling using shell loops.
- ECM=(250,350,500,1000)
- names=(2f_z_h,2f_z_l,4f_sw_l,4f_sw_sl,4f_sze_l,4f_szeorsw_l,4f_sze_sl, 4f_sznu_l,4f_sznu_sl,4f_ww_h,4f_ww_l,4f_ww_sl,4f_zz_h,4f_zz_l,4f_zzorww_h,4f_zzorww_l,4f_zz_sl)
- pol=(eL.pR,eR.pL,eL.pL,eR.pR)
- epol=(-0.8,-0.7)
- ppol=(+0.8,+0.7)

- For the old way you need 5 for loops (ecm, name, pol, epol, ppol).
  - You call many times ild-xsec-db until you exhausted all the arguments.
- With the new version you just need one call to ild-xsec-db.

Old Way (not very simple)

```
echo ;(
  names="2f_z_h 2f_z_l 4f_sw_l 4f_sw_sl 4f_sze_l 4f_szeorsw_l 4f_sze_sl 4f_sznu_l \
 4f_sznu_sl 4f_ww_h 4f_ww_l 4f_ww_sl 4f_zz_h 4f_zz_l 4f_zzorww_h 4f_zzorww_l 4f_zz_sl"
  ecm="250 350 500 1000"
  pol="eL.pR eR.pL eL.pL eR.pR"
  epol="-0.8 -0.7"
  ppol="+0.8 +0.7"
  for n in $names
  do
    for e in $ecm
    do
      for p in $pol
      do
        for EPOL in $epol
        do
          for PPOL in $ppol
          do

             ilc-xsec-db --name=$n --ecm=$e --pol=$p  --epol=$EPOL --pol=$PPOL

          done
        done
      done
    done
  done
)
```

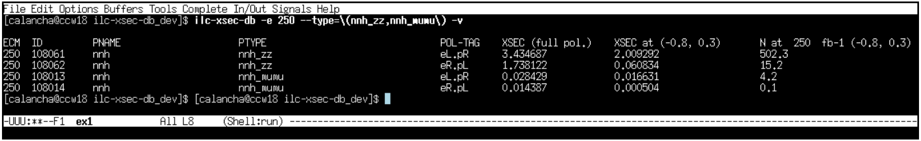
New Way (Much nicer)

```
NAMES="[2f_z_h,2f_z_l,4f_sw_l,4f_sw_sl,4f_sze_l,4f_szeorsw_l,4f_sze_sl,4f_sznu_l,4f_sznu_sl,4f_ww_
4f_ww_sl,4f_zz_h,4f_zz_l,4f_zzorww_h,4f_zzorww_l,4f_zz_sl]"
ECM="[250,350,500,1000]"
POL="[eL.pR,eR.pL,eL.pL,eR.pR]"
EPOL="[-0.8,-0.7]"
PPOL="[+0.8,+0.7]"

ilc-xsec-db --name="$NAMES" --ecm="$ECM" --pol_tag="$POL"  --epol="$EPOL" --ppol="$PPOL"
```

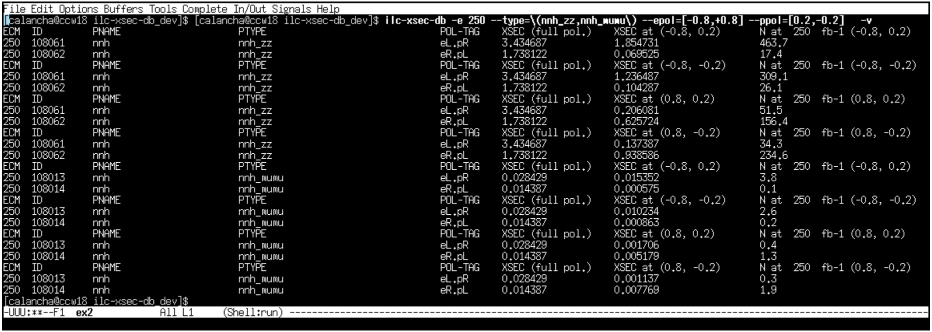
- These examples from a development version.
- I will located in same kekcc place the new release very soon (i will send e-mail).
- Code is reasy but i need to update the documentation...

Examples

- Example calling argument with option being a list.
- Notice how i need to scape the shell interpretation of the special characters '(' and ')'.
- Python style lists [a,b,..,c] are also supported.


File Edit Options Buffers Tools Complete In/Out Signals Help

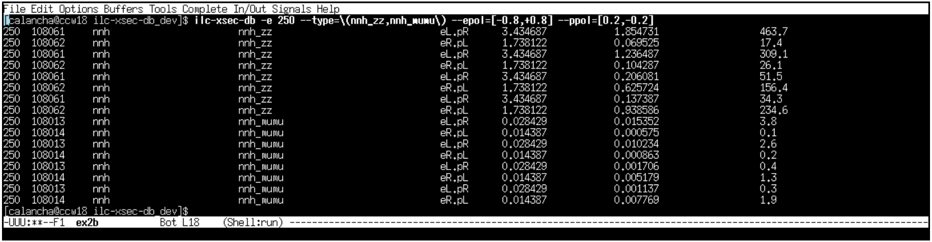
```
[calancha@ccw18 ilc-xsec-db_dev]$ ilc-xsec-db -e 250 --type=\(nnh_zz,nnh_mumu\) -v

ECM  ID            PNAME                         PTYPE                                    POL-TAG      XSEC (full pol.)       XSEC at (-0.8, 0.3)           N at  250  fb-1 (-0.8, 0.3)
250  108061        nnh                           nnh_zz                                   eL.pR        3.434687               2.009292                      502.3
250  108062        nnh                           nnh_zz                                   eR.pL        1.738122               0.060834                      15.2
250  108013        nnh                           nnh_mumu                                 eL.pR        0.028429               0.016631                      4.2
250  108014        nnh                           nnh_mumu                                 eR.pL        0.014387               0.000504                      0.1
[calancha@ccw18 ilc-xsec-db_dev]$ [calancha@ccw18 ilc-xsec-db_dev]$ 

-UUU:**--F1  ex1           All L8      (Shell:run) ----------------------------------------------------------------------------------------------------------
```


File Edit Options Buffers Tools Complete In/Out Signals Help

```
[calancha@ccw18 ilc-xsec-db_dev]$ [calancha@ccw18 ilc-xsec-db_dev]$ ilc-xsec-db -e 250 --type=\(nnh_zz,nnh_mumu\) --epol=[-0.8,+0.8] --ppol=[0.2,-0.2]   -v
ECM  ID            PNAME                         PTYPE                                    POL-TAG      XSEC (full pol.)       XSEC at (-0.8, 0.2)           N at  250  fb-1 (-0.8, 0.2)
250  108061        nnh                           nnh_zz                                   eL.pR        3.434687               1.854731                      463.7
250  108062        nnh                           nnh_zz                                   eR.pL        1.738122               0.069525                      17.4
ECM  ID            PNAME                         PTYPE                                    POL-TAG      XSEC (full pol.)       XSEC at (-0.8, -0.2)          N at  250  fb-1 (-0.8, -0.2)
250  108061        nnh                           nnh_zz                                   eL.pR        3.434687               1.236487                      309.1
250  108062        nnh                           nnh_zz                                   eR.pL        1.738122               0.104287                      26.1
ECM  ID            PNAME                         PTYPE                                    POL-TAG      XSEC (full pol.)       XSEC at (0.8, 0.2)            N at  250  fb-1 (0.8, 0.2)
250  108061        nnh                           nnh_zz                                   eL.pR        3.434687               0.206081                      51.5
250  108062        nnh                           nnh_zz                                   eR.pL        1.738122               0.625724                      156.4
ECM  ID            PNAME                         PTYPE                                    POL-TAG      XSEC (full pol.)       XSEC at (0.8, -0.2)           N at  250  fb-1 (0.8, -0.2)
250  108061        nnh                           nnh_zz                                   eL.pR        3.434687               0.137387                      34.3
250  108062        nnh                           nnh_zz                                   eR.pL        1.738122               0.938586                      234.6
ECM  ID            PNAME                         PTYPE                                    POL-TAG      XSEC (full pol.)       XSEC at (-0.8, 0.2)           N at  250  fb-1 (-0.8, 0.2)
250  108013        nnh                           nnh_mumu                                 eL.pR        0.028429               0.015352                      3.8
250  108014        nnh                           nnh_mumu                                 eR.pL        0.014387               0.000575                      0.1
ECM  ID            PNAME                         PTYPE                                    POL-TAG      XSEC (full pol.)       XSEC at (-0.8, -0.2)          N at  250  fb-1 (-0.8, -0.2)
250  108013        nnh                           nnh_mumu                                 eL.pR        0.028429               0.010234                      2.6
250  108014        nnh                           nnh_mumu                                 eR.pL        0.014387               0.000863                      0.2
ECM  ID            PNAME                         PTYPE                                    POL-TAG      XSEC (full pol.)       XSEC at (0.8, 0.2)            N at  250  fb-1 (0.8, 0.2)
250  108013        nnh                           nnh_mumu                                 eL.pR        0.028429               0.001706                      0.4
250  108014        nnh                           nnh_mumu                                 eR.pL        0.014387               0.005179                      1.3
ECM  ID            PNAME                         PTYPE                                    POL-TAG      XSEC (full pol.)       XSEC at (0.8, -0.2)           N at  250  fb-1 (0.8, -0.2)
250  108013        nnh                           nnh_mumu                                 eL.pR        0.028429               0.001137                      0.3
250  108014        nnh                           nnh_mumu                                 eR.pL        0.014387               0.007769                      1.9
[calancha@ccw18 ilc-xsec-db_dev]$
-UUU:**--F1  ex2           All L1      (Shell:run) ----------------------------------------------------------------------------------------------------------
```

Example

- Same as previous example without verbose option.



File Edit Options Buffers Tools Complete In/Out Signals Help

```
[calancha@ccw18 ilc-xsec-db_dev]$ ilc-xsec-db -e 250 --type=\(nnh_zz,nnh_mumu\) --epol=[-0.8,+0.8] --ppol=[0.2,-0.2]
250  108061     nnh                       nnh_zz                              eL.pR      3.434687            1.854731                 463.7
250  108062     nnh                       nnh_zz                              eR.pL      1.738122            0.069525                 17.4
250  108061     nnh                       nnh_zz                              eL.pR      3.434687            1.236487                 309.1
250  108062     nnh                       nnh_zz                              eR.pL      1.738122            0.104287                 26.1
250  108061     nnh                       nnh_zz                              eL.pR      3.434687            0.206081                 51.5
250  108062     nnh                       nnh_zz                              eR.pL      1.738122            0.625724                 156.4
250  108061     nnh                       nnh_zz                              eL.pR      3.434687            0.137387                 34.3
250  108062     nnh                       nnh_zz                              eR.pL      1.738122            0.938586                 234.6
250  108013     nnh                       nnh_mumu                            eL.pR      0.028429            0.015352                 3.8
250  108014     nnh                       nnh_mumu                            eR.pL      0.014387            0.000575                 0.1
250  108013     nnh                       nnh_mumu                            eL.pR      0.028429            0.010234                 2.6
250  108014     nnh                       nnh_mumu                            eR.pL      0.014387            0.000863                 0.2
250  108013     nnh                       nnh_mumu                            eL.pR      0.028429            0.001706                 0.4
250  108014     nnh                       nnh_mumu                            eR.pL      0.014387            0.005179                 1.3
250  108013     nnh                       nnh_mumu                            eL.pR      0.028429            0.001137                 0.3
250  108014     nnh                       nnh_mumu                            eR.pL      0.014387            0.007769                 1.9
[calancha@ccw18 ilc-xsec-db_dev]$
-UUU:**--F1  ex2b          Bot L18    (Shell:run) ----------------------------------------------------------------------------------------------------
```

Results

	Old Way	New Way
START	Fri Oct 17 12:49:40 JST 2014	Fri Oct 17 12:49:02 JST 2014
END	Fri Oct 17 12:53:39 JST 2014	Fri Oct 17 12:49:16 JST 2014

- New way is much faster!
- It’s also much simple and safe.

Summary/Plan

Summary

- New release of ilc-xsec-db (v2.1).
- Support for arguments with options being lists.
- 100% Backward compatibility with previous version.
- More fast and simple sintaxis for complicated queries.

Plan

- Make available very soon on same kekcc location as previous release.
- Train one student to keep updated this DB in the future.
  - Volunteers are welcome.