Notes on 2-fermion group activities, OCT. 1999

Presented by Z. Wąs CERN and INP Cracow

Experiment contact: Marie-Noelle Minard (A), A. Olchevski (D), D. Bourilkov (L), M. Kobel (O) and $\nu\bar{\nu}$: G. Taylor.

EARLY QUESTIONS:

- **Where do we stand now?**
- **List of observables.**
- **Theoretical calculations and their systematic errors.**
- **Program's documentation.**
- **Comparisons.**
- **Theoretical topics.**

For workshop activities:
`http://www.to.infn.it/~giampier/lep2.html`

CERN

Our plan ... as of June:

- **We start with list of observables from experiments.**
- **Later theorist start writing descriptions of their programs and their systematic error for the observables.**
- **We work together on comparisons.**

Where do we stand now?

- **Finally list of observables is (basically) completed and we can calculate predictions for them.**
- **Having requested precision tags, we can start writing presentations of calculations and programs.**
- **Also comparisons between different programs and data can be performed now.**
- **List of points which need general overview to be written at the end of the workshop starts to form.**
- **Tomorrow we should discuss technical details.**

Where are we now?

How do we have estimated required precision tag?

- **Decrease present single collaboration statistical error by factor of $\sqrt{12} \simeq 3.5$. We expect statistics to grow by factor of 3 and we will combine all 4 experiments.**
- **Experimental systematic error can go down by 2 to 3. Improvements and non-correlations among experiments.**
- **The two above should be added in quadrature.**
- **As required precision we take $1/3$ of that, so theoretical effects will not deteriorate experimental results by more than 10% .**

WARNING: Even 10 % is a lot. The same loss of precision for observable of roughly equal experimental statistical and systematic error would occur if 1/3 of data was lost. That is like 1 year of LEP running !!!

List of observables, typical precision tags:

- e^-e^+ **0.1-0.2 %** **(+ 1 photon 1.3 %)** **(+ 2 photon 3 %)**
- $\mu^-\mu^+$ **0.4-0.5 %** **(+ 1 photon 1.4 %)** **(+ 2 photon 5 %)**
- $\tau^-\tau^+$ **0.4-0.6 %** **(+ 1 photon 1.4 %)** **(+ 2 photon 5 %)**
- $\nu\bar{\nu}$ — **(+ 1 photon 0.2 %)** **(+ 2 photon 1 %)**

How does it match?

- Physics at LEP2 vol.2 page 231: The LABH (Large Angle Bhabha) process at LEP2 is not of major interest, and we think that a precision of order of 2% is enough.
- Physics at LEP2 vol.1 page 222: Single-photon production $\nu\bar{\nu}\gamma$: ... indicating that a theoretical precision below 1% (4 experiments) is desirable.

List of theoretical issues to be discussed at certain point:

- **Size of higher order effects.**
- **s' -cut-off and its variations**
- **Initial-final state interference and its subtraction.**
- **Pair correction and its cut-off dependence**
- **...**

Do these names mean the same in languages we use in distinct theoretical approaches?

Call for programs and predictions:

- Short statement about program content
- Program availability
- Observables it can be used for and estimates of systematic error for program results.
- Example study of systematics
- In particular excluded effects.

Tables for comparisons.

- **Who should do them?**
- **Do we need big table of comparisons, or small individual for observables?**
- **Do we all understand observable definitions (and all in the same way?)**
- **should author prepare input in a form:**
  - **label in our repport**
  - **prediction**
  - **its statistical error**
  - **authors estimate of an overall uncertainty.**

So we can have special program to present them in common and (may be) with experimental data as well ?