Yes, Virginia, there is a life after Zedometry

Precision Electroweak Measurements at the Z Resonance

a combination of 5 great experiments

Richard Kellogg
3-Dec-2004

After so many years....

- 296 pages (which are actually quite readable)
- final results on all measurements
- 1/3 σ shift in $A_{fb}(b)$ due to Zfitter bug - increasing discrepancy wrt A_{lr}
- new pdf calculation which would reduce NuTeV $\sin^2\theta_W$ discrepancy by 1 σ

Final Results

- DELPHI Afb(b) NN - hep/ex 0412004 (today!)
- SLD Ab/Ac - hep/ex 410042 (15-oct-04)
- SLD Rb/Rc - numbers 21-jul-04 - still only rough draft

The long march of Ab/Ac

19-nov-03	editorial process under way
04-dec-03	final numbers by end of year
08-jan-04	final numbers ***very*** shortly
05-feb-04	numbers end of next week
23-mar-04	numbers ready
21-jul-04	~ready for journal (numbers released)
04-sep-04	implementation of final comments
15-oct-04	hep/ex 040042
02-dec-04	still - “submitted to Phys. Rev. Lett.”

Waiting for Godot

- We must avoid having a fully approved paper this spring, waiting only for publication of Rb/Rc
- Rb/Rc is currently “rough draft”
- Simply extrapolating Ab/Ac says we cannot wait

Mitigating Circumstances for Rb/Rc

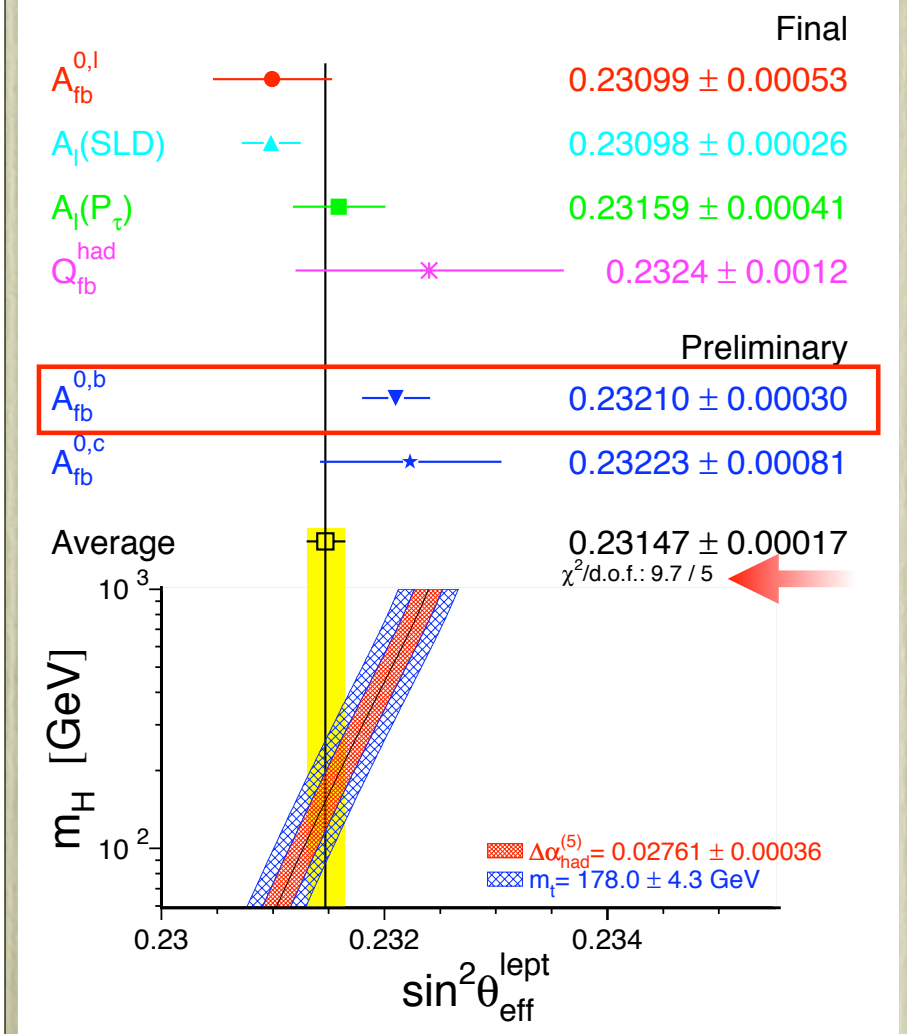
- no interference from Ab/Ac
- numbers are ready
- deadline pressure is real
- strategy to be discussed....

The Shift in Afb°(b)

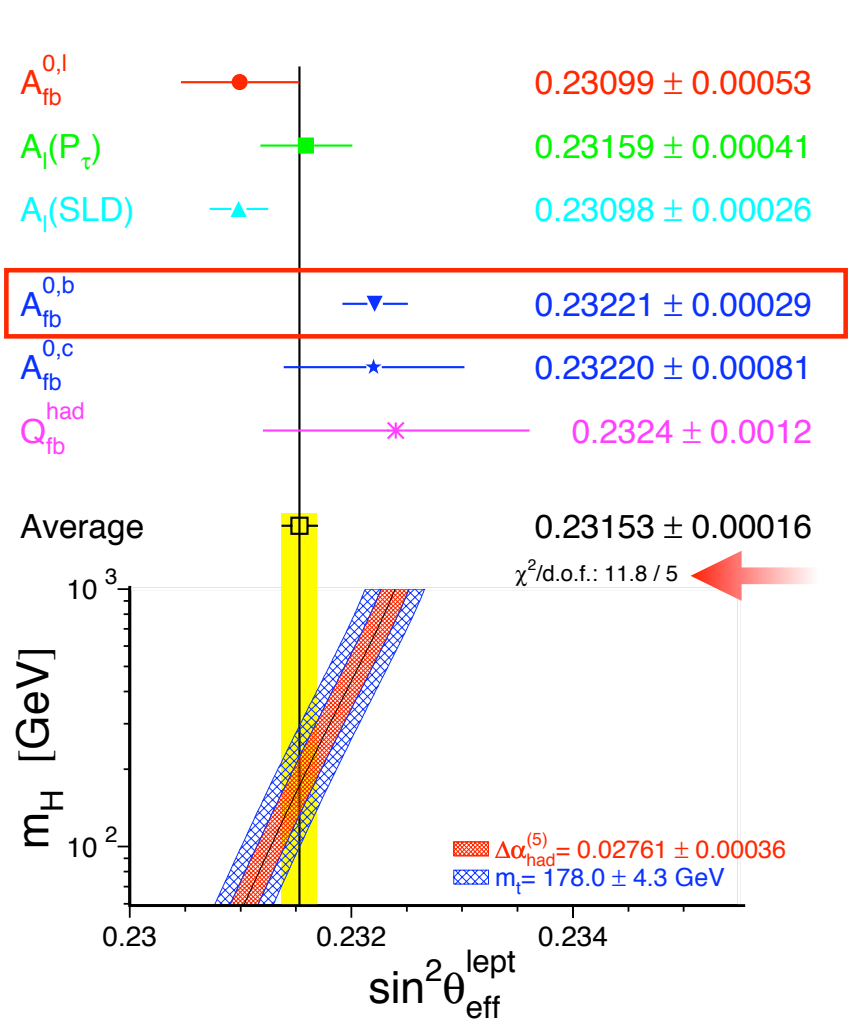
- Since 1994 Zfitter has suffered from a bug in the weak correction flag AMT=4, such that corrections to the *realistic observable* Afb(b) were actually made with AMT=3 (affected b-quarks only)
- The corrections to the *pseudo-observable* Afb°(b) were always done correctly
- The HF corrections were δ = Afb°(b)-Afb(b)
- ergo - the problem

- The effect is 0.0006 - 1/3 the Afb(b) total error, twice the assigned theory error
- Ayres Freitas & Klaus Mönig have corrected the problem - hep-ph/0411304
- And a check is provided by TOPAZ - hep-ph/9902452

summer 2004

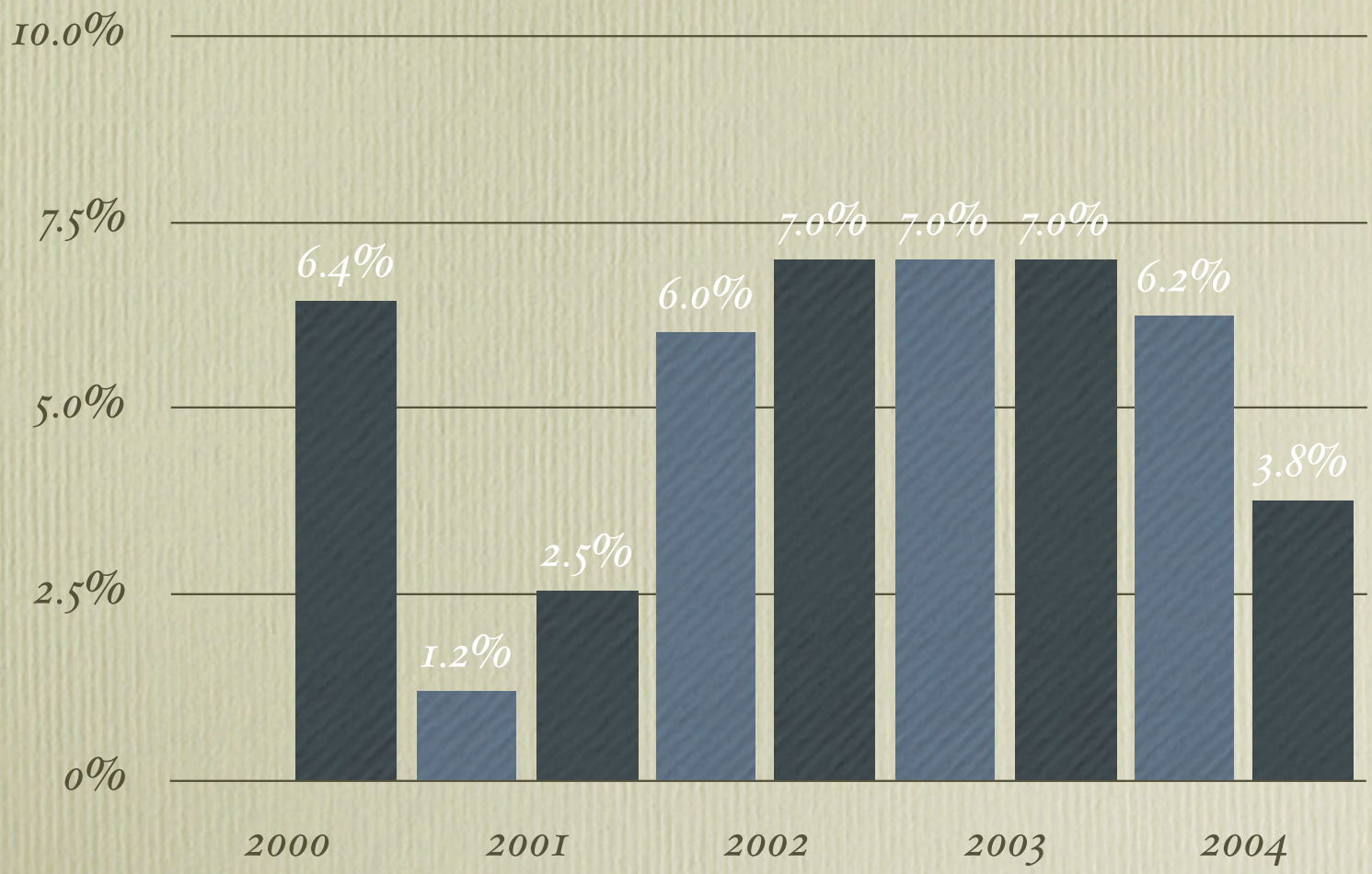


fall 2004



CL History of $\sin^2\theta_w$ fit

not good ... but we have seen worse



Discrepancy Policy

- "Alternatives" policy proposed by OPAL in 2001 seems to be holding
- quote M_{higgs} results w/o (Afb(b), Alr, or both)

Alternative results on M_{higgs}

fit	M_H(GeV)	68% CL upper limit	fit CL
all	126	174	15%
w/o Alr	172	270	27%
w/o Afb(b)	74	128	64%
w/o both	101	176	65%

It might be helpful to have a re-expression of OPAL support to continue in this manner

$\sin^2\theta_w$ from NuTeV νN

- Decision made last spring to exclude all low-Q^2 measurements from the fit
- Comparison with fit predictions only
- Recent calculations of QED and s-asymmetry corrections would move NuTeV by 1 σ towards agreement
- NuTeV rumored to be making its own corrections

- Diener, Dittmaier and Hollik hep-ph_0310364 question the radiative corrections used in the NuTeV analysis
- Olness et.al. find large uncertainty in strangeness asymmetry from dimuon production hep-ph/0312323
- Kretzer et.al. find strangeness asym + isospin violating effects could remove NuTeV discrepancy hep-ph/0312322

The Author List Conundrum

- only precedent is Combined SM Higgs Search - Physics Letters B 565 (2003) 61–75
- one paper per collaboration cited for authors
- Z-Pole analyses are more diverse - need ~5 OPAL papers to pick up all relevant authors
- alternative is to make & print a special non-redundant list

- must be coordinated with all 5 collaborations
- in case of need, I volunteer to make the OPAL list

Conclusions

- Yes, this really is close to the conclusion
- OPAL Z-Pole editorial board meeting this afternoon 28-S-019 15:00
- All OPAL-ists welcome