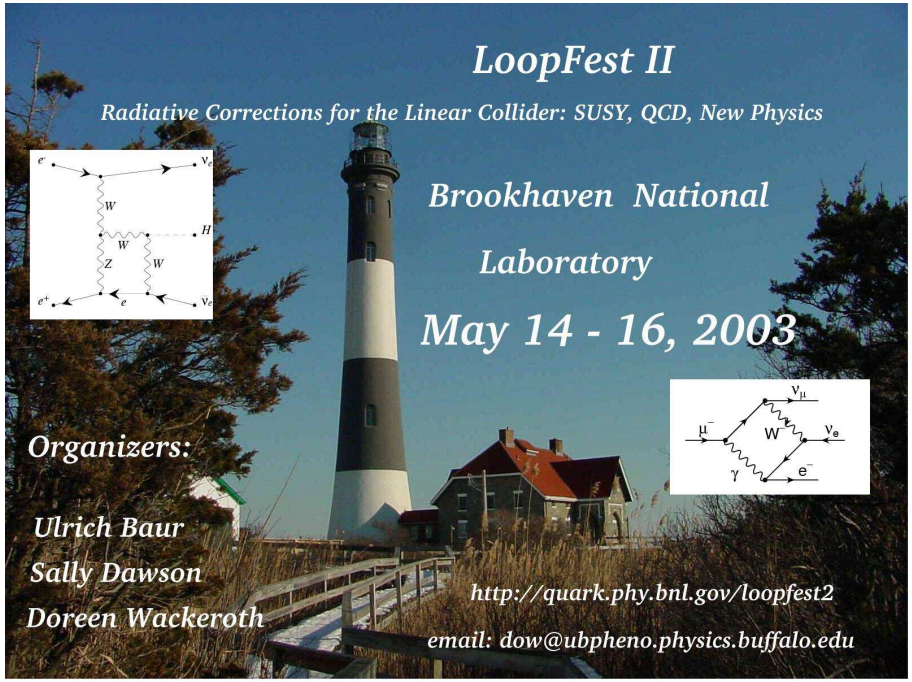
LoopVerein Summary

(UB, S. Dawson, D. Wackeroth)

- no session here at Cornell
- held 2.5 day LoopFest II at BNL May 14 – 16 with ~ 45 people attending



Highlights from LoopFest2

- almost all talks online at
  http://quark.phy.bnl.gov/loopfest2/program.html
- new developments:

  ☞ two independent calculations of the full $\mathcal{O}(\alpha)$ corrections to $e^+e^- \to \bar{\nu}\nu H$ available now (Belanger et al. and Denner et al.)

  → 1350 one-loop diagrams

  → corrections accidentally small at $\sqrt{s} = 500$ GeV ($\sim 0.2\%$)

  ☞ combined QCD+EWK corrections to $e^+e^- \to t\bar{t}H$ available now (Belanger et al.)

  → 2327 one-loop diagrams

☞ these massive calculations require automization tools:

→ `GRACE/1-LOOP` (KEK-Minami group)

→ `FeynCalc, FormCalc, LoopTools` (T. Hahn et al.)

→ these packages slowly become fully functional and complete (SM, SUSY)

☞ numerical evaluation of loop diagrams (E. deDonker)

→ NEW: use multivariate integration and extrapolation techniques

→ promising, but needs to prove itself

☞ the ρ parameter at 3 loops (J. Kühn et al.)

→ shift M_H extracted from M_W, M_t and precision EWK data upward by ~ 5 GeV

☞ multi-loop calculations:

➞ enormous progress seen in the past few years at 2-loop ($2 \to 2$): master integrals, physics results

☞ in progress: interface to event generators

- still need:

  ➞ complete 1-loop corrections for $2 \to 4$, $2 \to 6$ processes ($e^+e^- \to$ 4 fermions,...)

  ➞ better understanding of gauge invariance for massive unstable particles (W, Z,...) in loop calculations

  ➞ resummation of EWK Sudakov logarithms at high energies

- more to come at:

LoopFest III, Santa Barbara, April 1 – 3, 2004