

The poster for LoopFest II features a central image of a lighthouse on a rocky island. The text is arranged around the lighthouse. At the top, it reads "LoopFest II" and "Radiative Corrections for the Linear Collider: SUSY, QCD, New Physics". Below this is "Brookhaven National Laboratory" and the dates "May 14 - 16, 2003". The organizers listed are "Ulrich Baur", "Sally Dawson", and "Doreen Wackerroth". Contact information includes "http://quark.phy.bnl.gov/loopfest2" and "email: dow@ubpheno.physics.buffalo.edu". Two Feynman diagrams are included: one on the left showing a loop with a photon and a gluon, and one on the right showing a loop with a photon and a Z boson.

LoopFest II
Radiative Corrections for the Linear Collider: SUSY, QCD, New Physics

Brookhaven National
Laboratory
May 14 - 16, 2003

Organizers:
Ulrich Baur
Sally Dawson
Doreen Wackerroth

http://quark.phy.bnl.gov/loopfest2
email: dow@ubpheno.physics.buffalo.edu

- no session here at Cornell
 - held 2.5 day **LoopFest II** at BNL May 14 – 16 with ~ 45 people attending
- (UB, S. Dawson, D. Wackerroth)

LoopVerein Summary

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 $e^+e^- \rightarrow \bar{\nu}H$ available now (Belanger et al. and Denner et al.)

↪ 1350 one-loop diagrams

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

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

↪ 2327 one-loop diagrams

- ☞ these massive calculations require automation tools:
 - GRACE/1-LOOP (**KEK-Miami 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

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

- more to come at:
 - ← resummation of EWK Sudakov logarithms at high energies
 - ← better understanding of gauge invariance for massive unstable particles (W, Z, \dots) in loop calculations
 - 4 fermions, ...)
 - ← complete 1-loop corrections for $2 \rightarrow 4, 2 \rightarrow 6$ processes ($e^+e^- \rightarrow$
- still need:
 - 👉 in progress: interface to event generators
 - master integrals, physics results
 - ← enormous progress seen in the past few years at 2-loop ($2 \rightarrow 2$):
 - 👉 multi-loop calculations: