



# WORKSHOP CHARGE

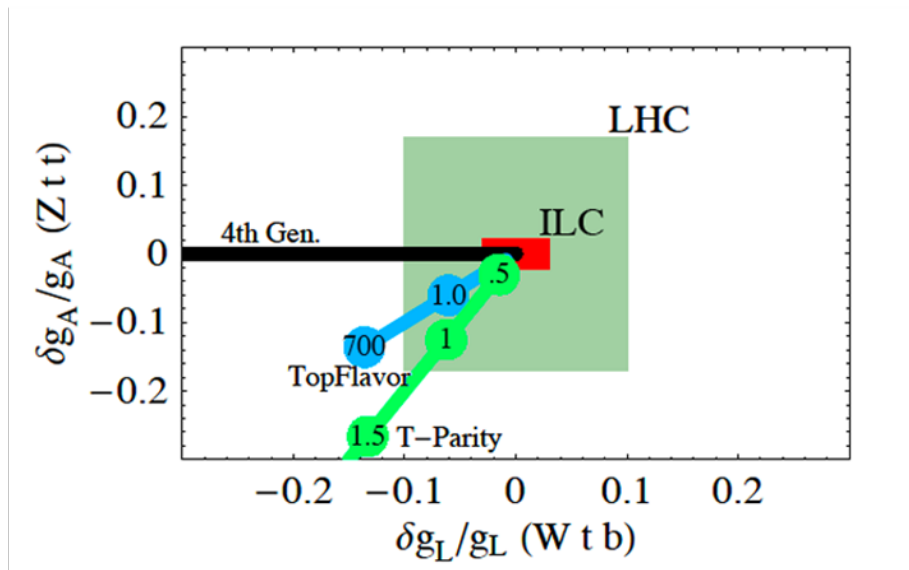
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# ILC Physics (RDR)

- Standard-Model Gauge Bosons
  - e.g.  $WW\gamma$  coupling to  $10^{-4}$  rel. ( $\sim 0.1$ x LHC)
- Top quark
  - e.g. Mass to 100~200 MeV ( $\sim 0.1$ x LHC)
  - e.g.  $tbW$ ,  $ttZ$  couplings to 2% rel.





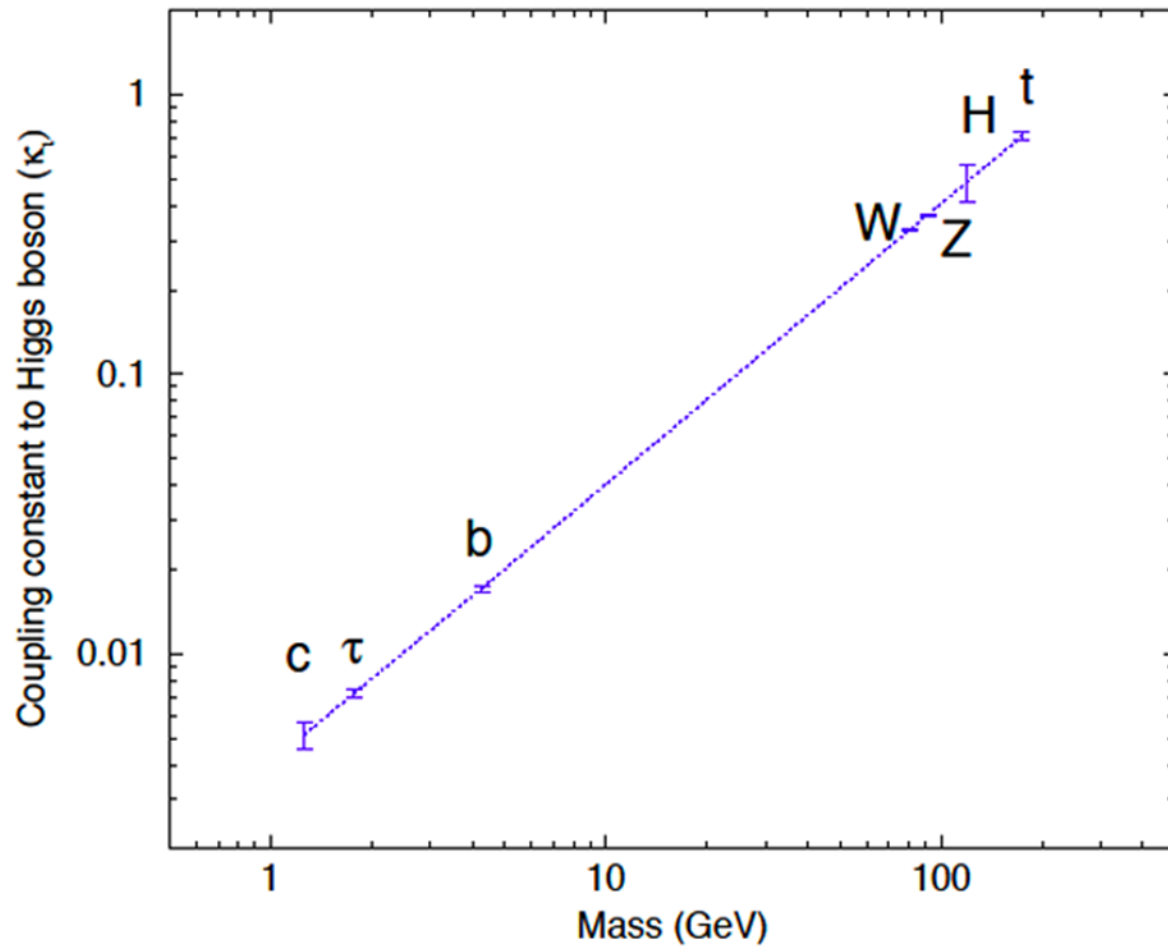
# ILC Physics: Higgs

- Higgs detection:
  - ~1 day for ILC (~1 year for LHC)
  - Errors for couplings/rates:
    - Typically 1/10 wrt LHC
- Measure Higgs properties: ( $m_H=120$  GeV)
  - $m_H$  to ~50 MeV
  - $\Gamma_H$  to ~5%
  - Spin/Parity



# Higgs couplings

Coupling–Mass Relation





# Higgs couplings

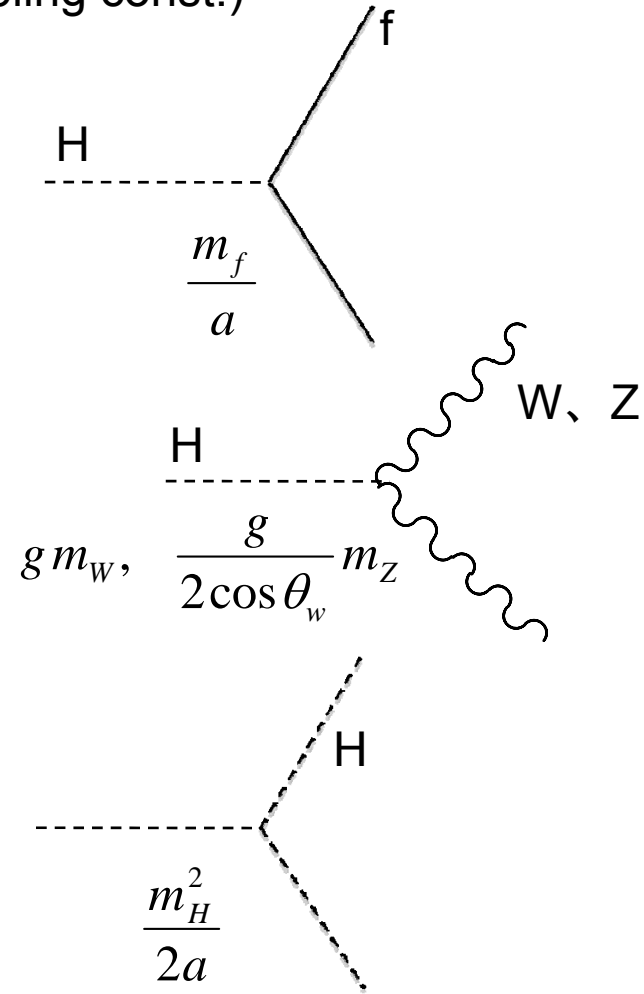
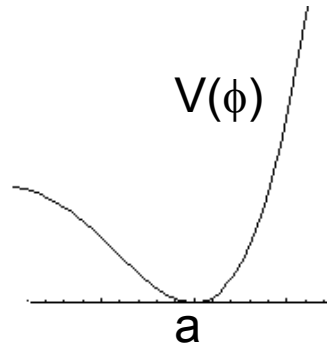
(a: VEV, g: SU(2) coupling const.)

- Fermions
  - Yukawa coupling

- Gauge Bosons
  - Gauge coupling

- Self coupling
  - Higgs potential

- 3<sup>rd</sup> order term around VEV





# New Physics

- SUSY
    - ILC good at charginos, neutralinos, sleptons.
    - Measure mass, spin, parity of sparticles
    - Reconstruct Lagrangian
    - Verify dark matter (relic density)
  - Extra dimensions
    - KK mode gravitons
  - Little Higgs, etc...
- Mostly based on quick simulators -



# LOIs

- **Physics analyses**
  - Substantially updated
  - Full simulation, more realistic backgrounds
  - More to come (some are still premature)
- **Detector optimization**
  - Serious attempts made
- **Hardware R&Ds**
  - Intensive efforts continue

**Presented in the talks to follow**



# IDAG validation

- LOI guideline
  - Philosophy, overall concept to address ILC physics
    - Agreed-upon benchmark modes
  - State of R&Ds and plans toward real detector
  - Group structure and resource needs
  - Cost
- Additional items by IDAG
  - Machine background sensitivities
  - Calibration and alignment
  - Engineering (support, dead regions)
  - Push-pull
  - 1 TeV design
  - Optimization method





# Benchmark Modes

Designed to test detector performances

- $e^+e^- \rightarrow ZH$  (@250 GeV,  $m_H=120$  GeV)
  1.  $H \rightarrow X, Z \rightarrow e^+e^-/\mu^+\mu^-$
  2.  $H \rightarrow cc, Z \rightarrow \nu\nu$
  3.  $H \rightarrow cc, Z \rightarrow qq$
- 4.  $e^+e^- \rightarrow \tau^+\tau^-$  (@500 GeV)
- 5.  $e^+e^- \rightarrow tt, t \rightarrow 3j$  (@500 GeV)
- 6.  $e^+e^- \rightarrow |_{1^+}|_{1^-}, |_{2^0}|_{2^0}$  (@500 GeV, 'SUSY point 5')



# ILC Physics Sessions

- ‘Physics and Benchmarks sessions’
  - Mostly the benchmark modes
  - 18<sup>th</sup> all day @202
- ‘Physics sessions’
  - Mostly modes other than benchmarks
    - ZHH, ttH, little Higgs, dark matter...
  - 19<sup>th</sup> 4pm, 20<sup>th</sup> 11am @401



# R&Ds and Plans

- Vertex/Tracking sessions
  - 18<sup>th</sup> 11am,2pm, 19<sup>th</sup> 2pm, 20<sup>th</sup> 9am @304
- Cal/Muon/DAQ sessions
  - 18<sup>th</sup> 9am,11am @401, 19<sup>th</sup> 4pm, 20<sup>th</sup> 11am @304
- MDI sessions
  - LOI MDI reports, exp. hall, BPM, forward region...
  - 18<sup>th</sup> 9am @304, 20<sup>th</sup> 9am,11am @202
- Sim/Rec/Opt sessions
  - Software tools, flavor tagging, jet clustering...
  - 19<sup>th</sup> 2pm, 4pm @202
- LCTPC report (plenary)
  - 20<sup>th</sup> 2:30pm @202



# Push-pull

- How long does it take to switch?
  - Depends on who you ask
  - Varies from a few hours to a few weeks
- Critical issue if we want two detectors to share data taking
- ACFA/BDS joint plenary
  - Focused on push-pull issues (+ some others)
  - 19<sup>th</sup> 9am, 11am @202



# Gamma-gamma option

- Gamma-gamma/MDI/BDS joint session
  - 18<sup>th</sup> 2pm @401
- Gamma-gamma/Physics joint session
  - 19<sup>th</sup> 2pm @401
- Gamma-gamma physics (plenary)
  - 18<sup>th</sup> 5pm @202



# CERN Connections

- LHC connections
    - ‘LHC to future collider’ workshop report
      - 20<sup>th</sup> 4:50pm
    - LHC/ILC cosmological connections
      - 18<sup>th</sup> 4pm
  - CLIC detector
    - 20<sup>th</sup> 4:20pm
- all plenary @202



# Research Directorate

- Common task group reports
    - Physics common task group
      - 18<sup>th</sup> 4:40pm
    - R&D common task group
      - 20<sup>th</sup> 2pm
    - Software common task group
      - 20<sup>th</sup> 3:05pm
  - IDAG report
    - 20<sup>th</sup> 4pm
- all plenary @202



So now, let us take a look at each LOI  
together with IDAG !