

Roadmap & European LC Strategy

- **Facts from LHC**
- **Options (Staged energy approach)**
- **European Strategy (Cracow, BB, CERN)**
- **Further activities: LCForum, Report**

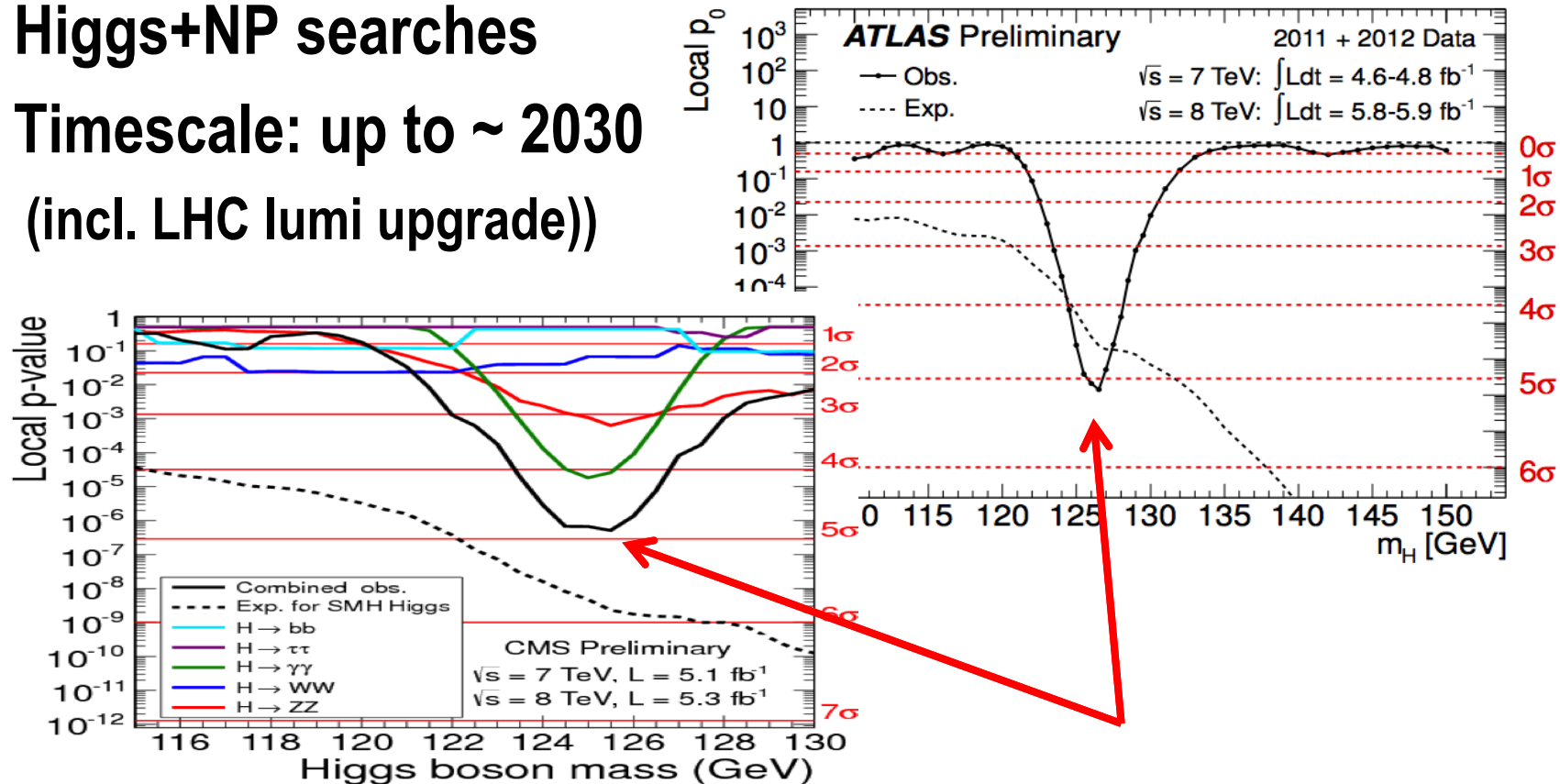
Status LHC results -- in short

- **Excess compatible with a SM-like Higgs around $m_H \sim 125$ GeV**
 - Should become clearer this year.....
 - Would be an absolute revolution!
- **Limits in SUSY coloured sector (approx.):**
 - $m_g > 700$ GeV, $m_q > 800$ GeV
 - 3rd generation: much weaker
 - Results in $\Lambda > 31$ TeV in GMSB
- **Limits on Z' , W' : ~ 2 TeV**
- **And more limits on ED, exotics, 4th generation etc.**

Room left for a Linear Collider? Which energy steps?

Facts from LHC

- Higgs candidate with $m_H \sim 125$ GeV @ 4/7/2012 !
 - Rich physics programme for LHC
 - Higgs+NP searches
 - Timescale: up to ~ 2030 (incl. LHC lumi upgrade)



But: 'Higgs' or not 'the' Higgs ?

- **Immediate task list for the LC:**
 - Precise measurements of mass, spin, BR's, width, couplings, CP properties, Higgs potential,...
 - *Polarized beams required (see Mikael's talk!)*
 - will reveal whether we have a 'Higgs' and whether we have a 'SM Higgs' or 'BSM physics' (even if no further NP physics has been found at LHC)
 - **Different energy steps required:**
 - 250 GeV** (mass, spin, BR's), **350 GeV** (BR's, coupl.)
 - 500 GeV** (top coupl., trilinear) and **≥ 1 TeV**.
- This programme should be tackled a.s.a.p. !*

What else is left for a LC?

- **Top physics**

- mass precision via threshold scan required
- couplings via A_{FB} , A_{LR} , etc.

New physics is expected to show up in the couplings!

- **Full spectrum of BSM physics**

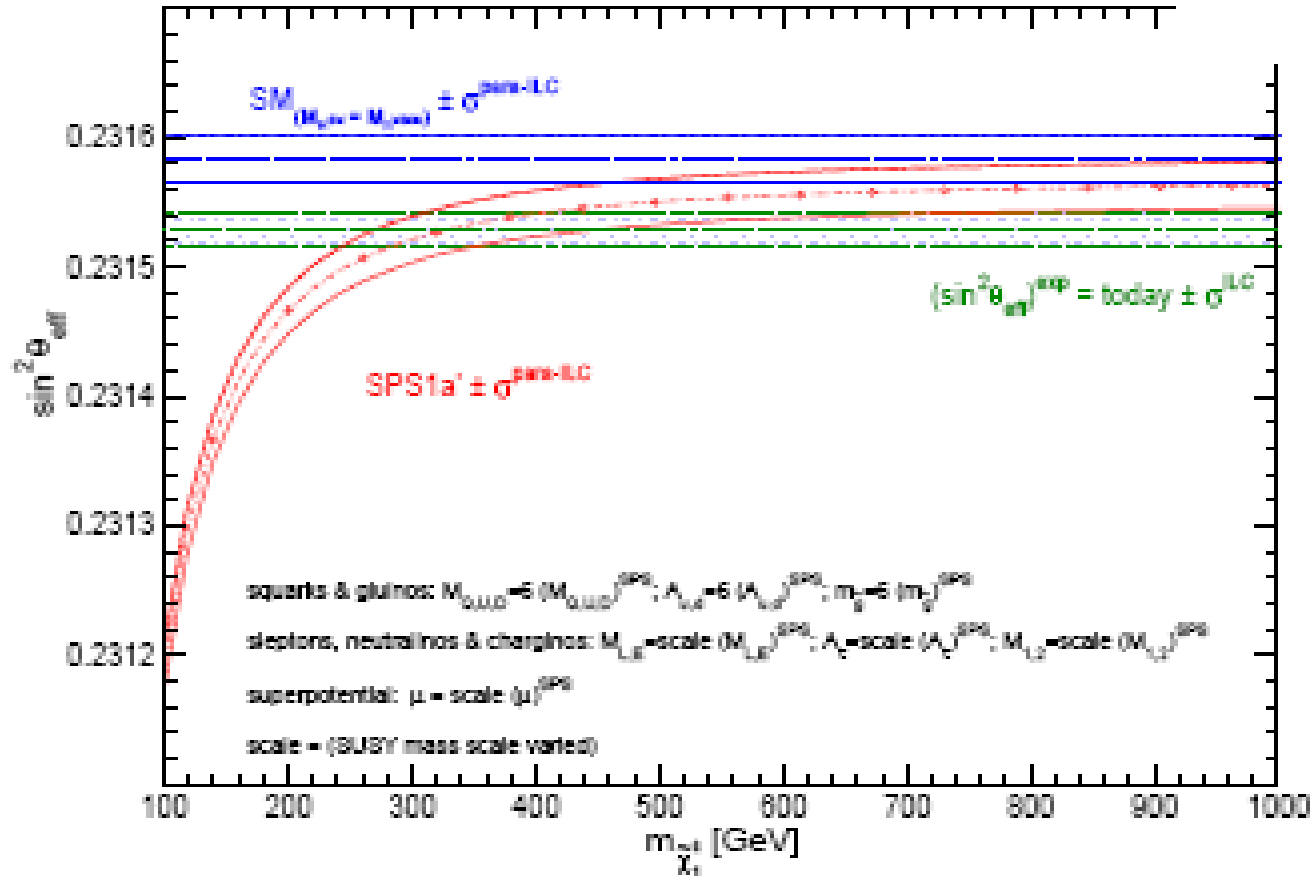
- Even light SUSY is still in concordance with LHC results!!! *(cf. Mikael's talk !)*

- **If all fails: high precision physics at GigaZ will reveal traces of new physics !**

GigaZ

- Assume only Higgs@LHC but no hints for SUSY

$\sqrt{s}=92 \text{ GeV}$



- $\sin^2 \theta_{\text{eff}}$ can be the crucial quantity to find traces of NP!

European Roadmap

- **Past:**

- **European Strategy for Particle Physics** was agreed in 2005
- **CERN Council adopted in July 2006** the Europeans current strategy
- This strategy should be **updated in intervals of ~5 years**

- **Presence:**

- CERN announced last December to **update the Strategy**
- **European Strategy Preparatory Group** (*appointed by the CERN Council*) initiated an '**Open Symposium**', September 10-12, 2012 at Krakow *that's next Monday!*
- Many input (world-wide!) for this meeting was submitted until July (GDE, ILC, CLIC, labs, individuals)

Open Symposium @ Krakow

- **About 480 participants ! (also from governments!)**
- **Schedule:**
 - **Dedicated speakers present the different topics**
 - **High energy frontier (LHC upgrades, LC,LHeC), flavour physics, neutrinos, collider options, new technologies**
 - **Much time for discussions foreseen to get further input from the community**
- **Outcome of Symposium: input for 'briefing book'**
(written by preparatory group)
- **European Strategy Group:**
 - **updates strategy in summer, provided to CERN Council**

Current Tendencies

- **LHC upgrade (lumi not energy) very important**
 - Physics programme up to about 2030
- **LC: timely and staged approaches important !**
 - **A crystal clear physics case** for the first stages
 - Higgs factory at 250 GeV
 - Higgs width and top mass at 350 GeV
 - Higgs and top couplings + possible NP at 500 GeV
 - Further upgrades to 1 TeV and beyond

Machine options should not preclude a staged approach !

Current Tendencies

- **Neutrino physics**

- Large θ_{13} was unexpected: mass hierarchies well covered via US and Asien project (incl. reactor neutrino project)
- More long-term: neutrino factory?

- **Flavour physics**

- Solid physics case for LHCb and Super B @ Japan

Further LC activities

- LC-notes server revived!

- <http://www-flc.desy.de/lcnotes/>

2012			
REP	LC-REP-2012-068	Determination of the CP parity of Higgs bosons in their tau decay channels at the ILC	2012-08-13

- Already **about 70** new, mainly physics LC-notes this year !
- *Please feel free to submit notes to the server (physics, detector, machine)!*

LC-Forum and LC-report

- **LC-Forum:**

- National activity comprising LC efforts from labs and Universities

- [Webpage: lcforum.desy.de](http://lcforum.desy.de)

- Initiated an *update of a LC (ILC+CLIC) physics report* (to be finished end 2012 and published in EPJC):

- **LC-Report:**

- Editorial board (world-wide collaboration):

Albrecht Wagner, Andreas Kronfeld, Jonathan Bagger, Dieter Schlatter, Gudrid Moortgat-Pick, James Brau, Joachim Mnich, John Ellis, Sabine Riemann, Ivor Fleck, Frank Simon, Kiyotomo Kawagoe, Sachio Komamiya, Michael Peskin, Hitoshi Yamamoto, Peter Zerwas

Conclusions

- **Many LC activities ongoing**
- **Clear physics case (Higgs,top+) for first energy stages**
- **LC notes collection, LC physics report under work**
- **Ongoing *'European Strategy for future Particle Physics'***
 - **LHC physics programme up to 2030**
 - **If Europe agrees that the LC has the high priority -> probably strong support for Japan**
 - **Please go ahead!**

Times seem never been better than now for the LC!