

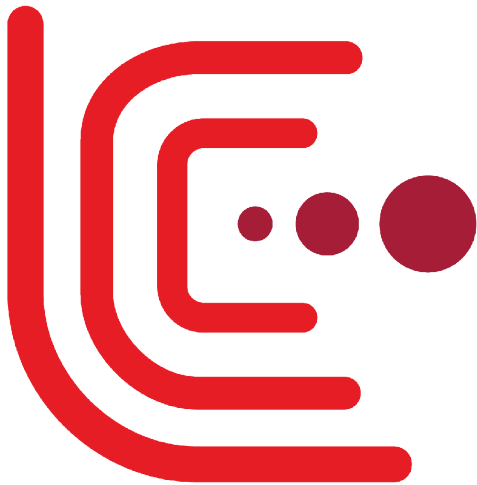
Update from the LCC Parameter Group

ILC @ DESY

General Project Meeting

Sept 19, 2014

J.List (DESY)



On behalf of the LCC Parameter Group

History...

- January: “Physics” part of group established (J.Brau, T.Barklow, K.Fujii, JL)
- February: extended to include accelerator part (N.Walker, J.Gao, K.Yokoya)
- May: First public presentation of intermediate status and community feed-back at AWLC14
- August: first version of draft report released to LCC Physics Group and LCB
- September 4: discussed feed-back received sofar at face-to-face meeting in Tokyo

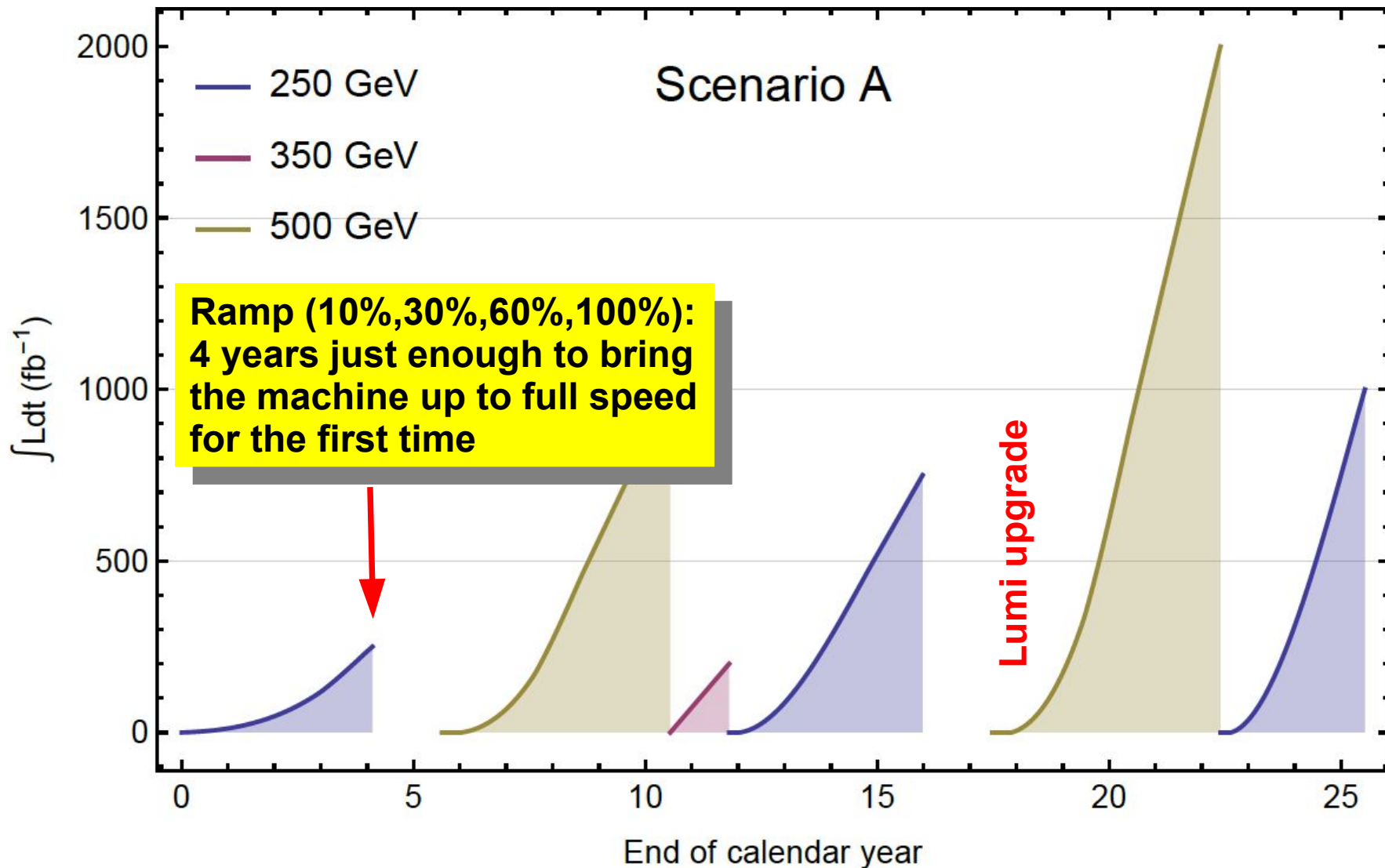
Charge

- The ILC parameter working group reports to the LCC Directorate. It consists of members from both the ILC accelerator and the physics & detector groups where each team selects a co-convener for this working group.
- This working group prepares information on ILC machine parameters and staging scenarios as well as potential upgrade paths in a form readily usable by the LCC. In doing so, the WG will take into account technical machine constraints and physics and detector needs regarding the fundamental ILC machine parameters such as energy, luminosity, crossing angles, etc.
- The first task for the working group is to prepare multiple scenarios for staging up to about 500 GeV. The report should contain the pros and cons of each scenario as well as luminosities needed at each energy to produce corresponding physics results.

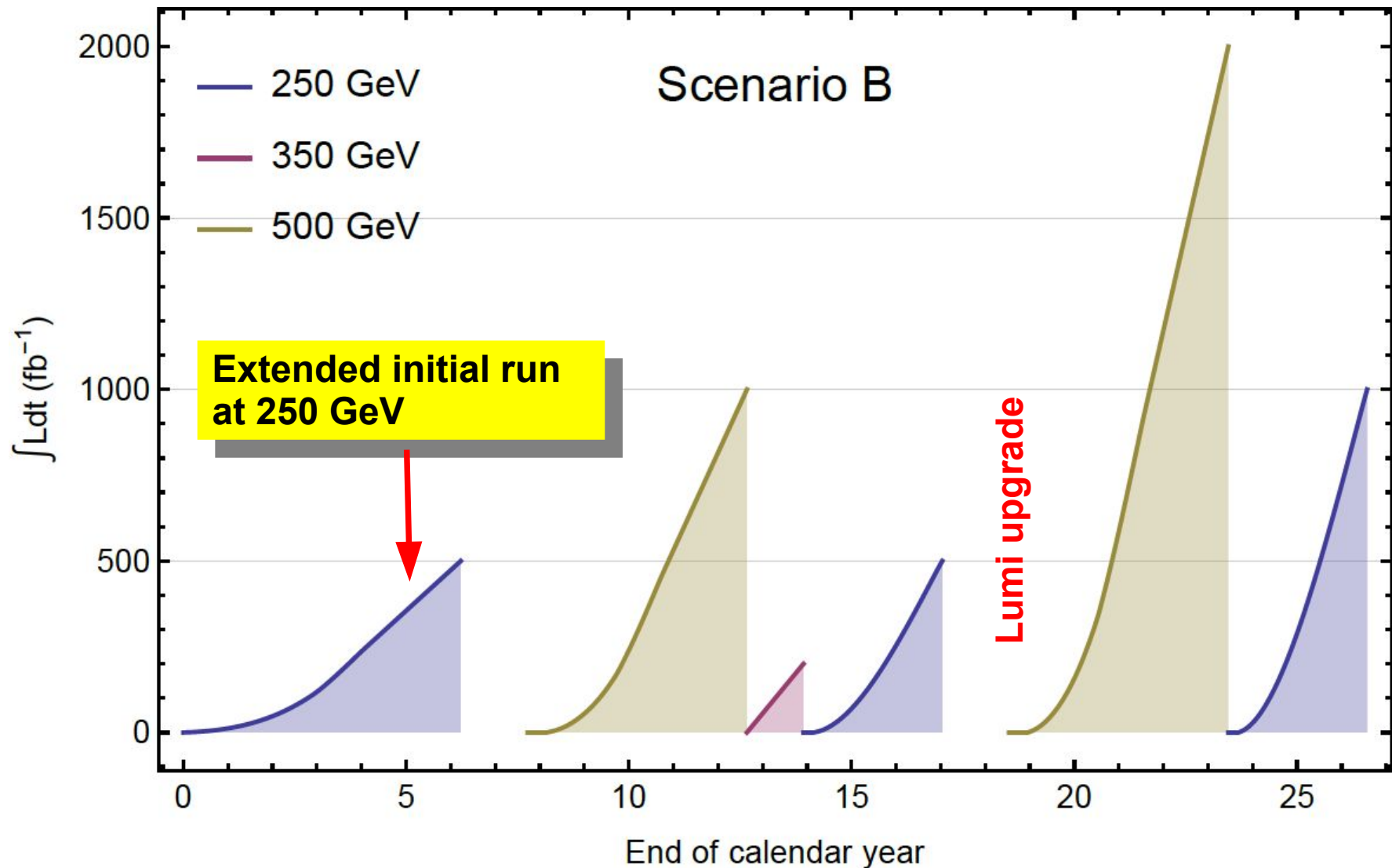
General Structure of Scenarios

- Start at 250 GeV (that was our charge!)
- Upgrade to 500 GeV (1.5 years)
- Lower energy to 350 GeV
- Take more 250 GeV data in 10Hz mode
- Luminosity upgrade (1.5 years)
- More 500 GeV data / more 250 GeV data

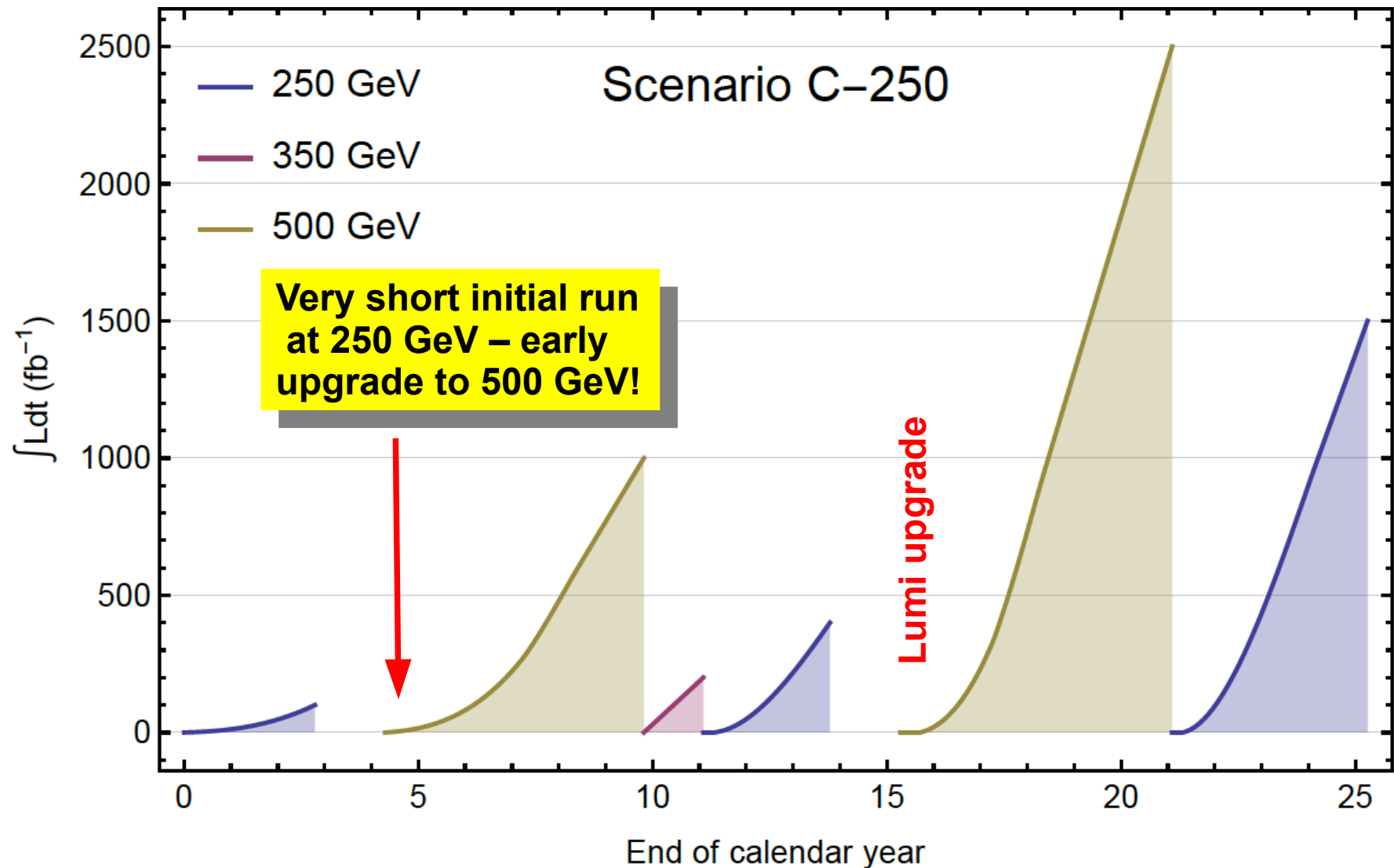
Scenario A – Start 250 GeV



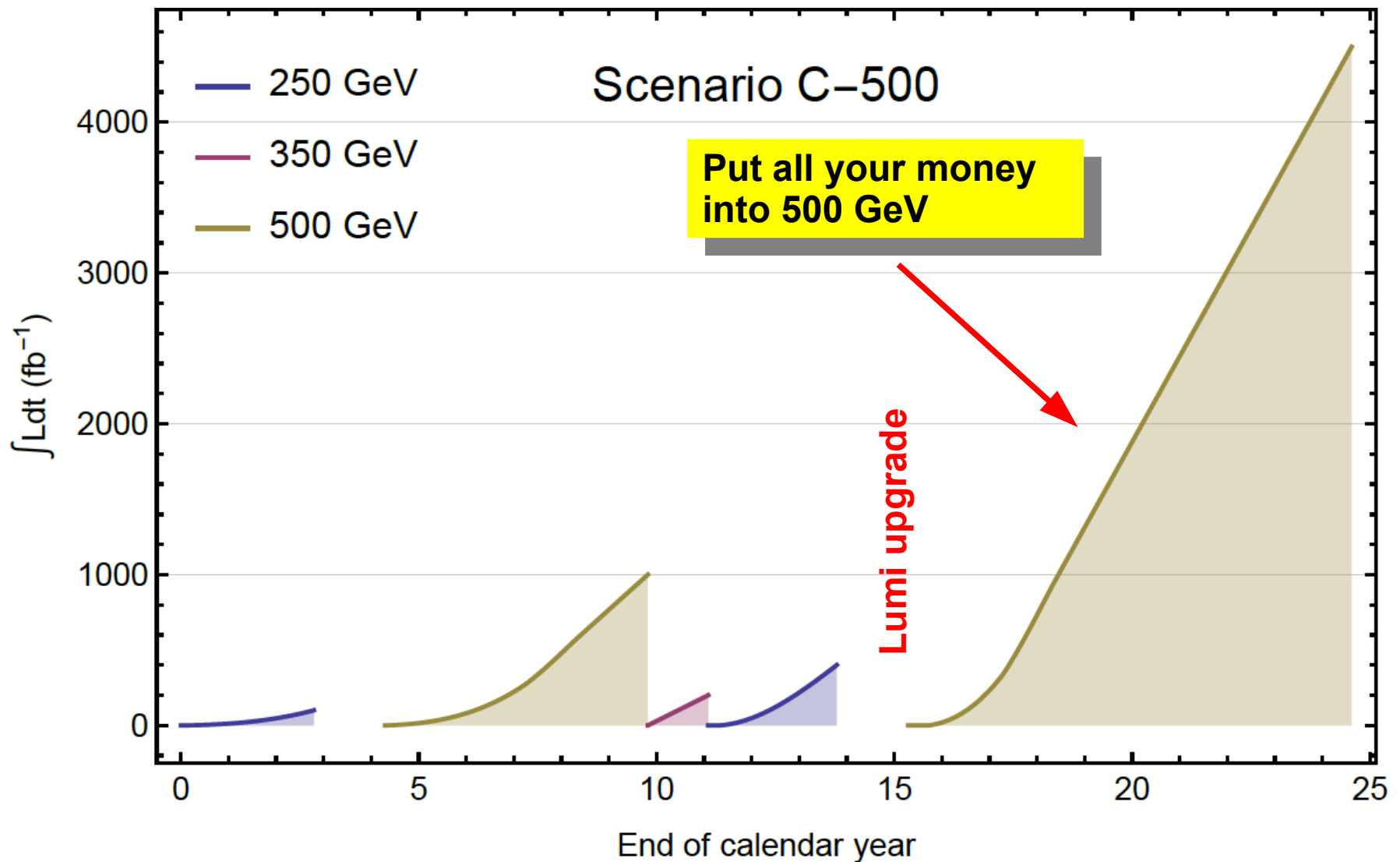
Scenario B – Start 250 GeV



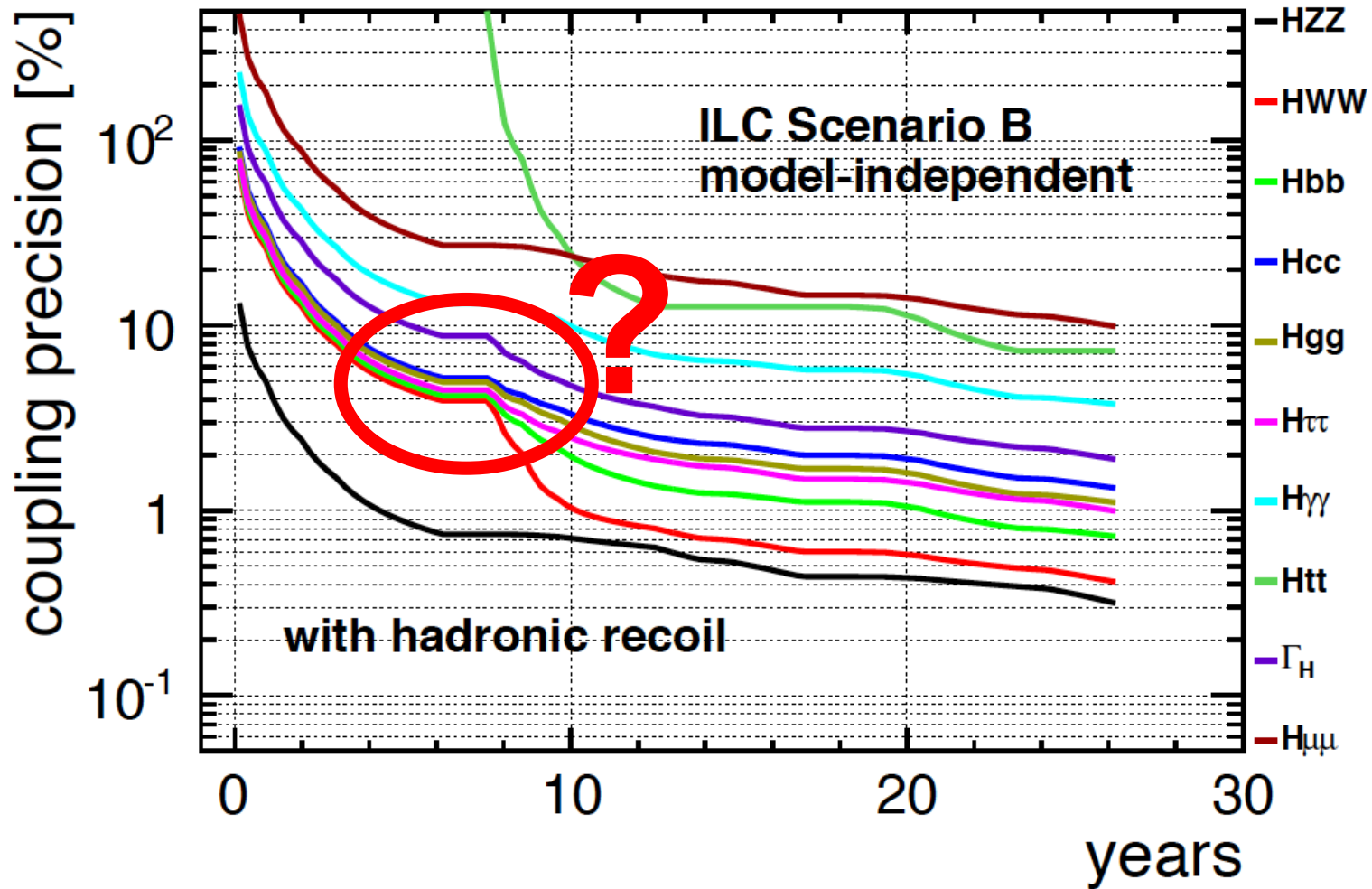
Scenario C-250 – Start 250 GeV



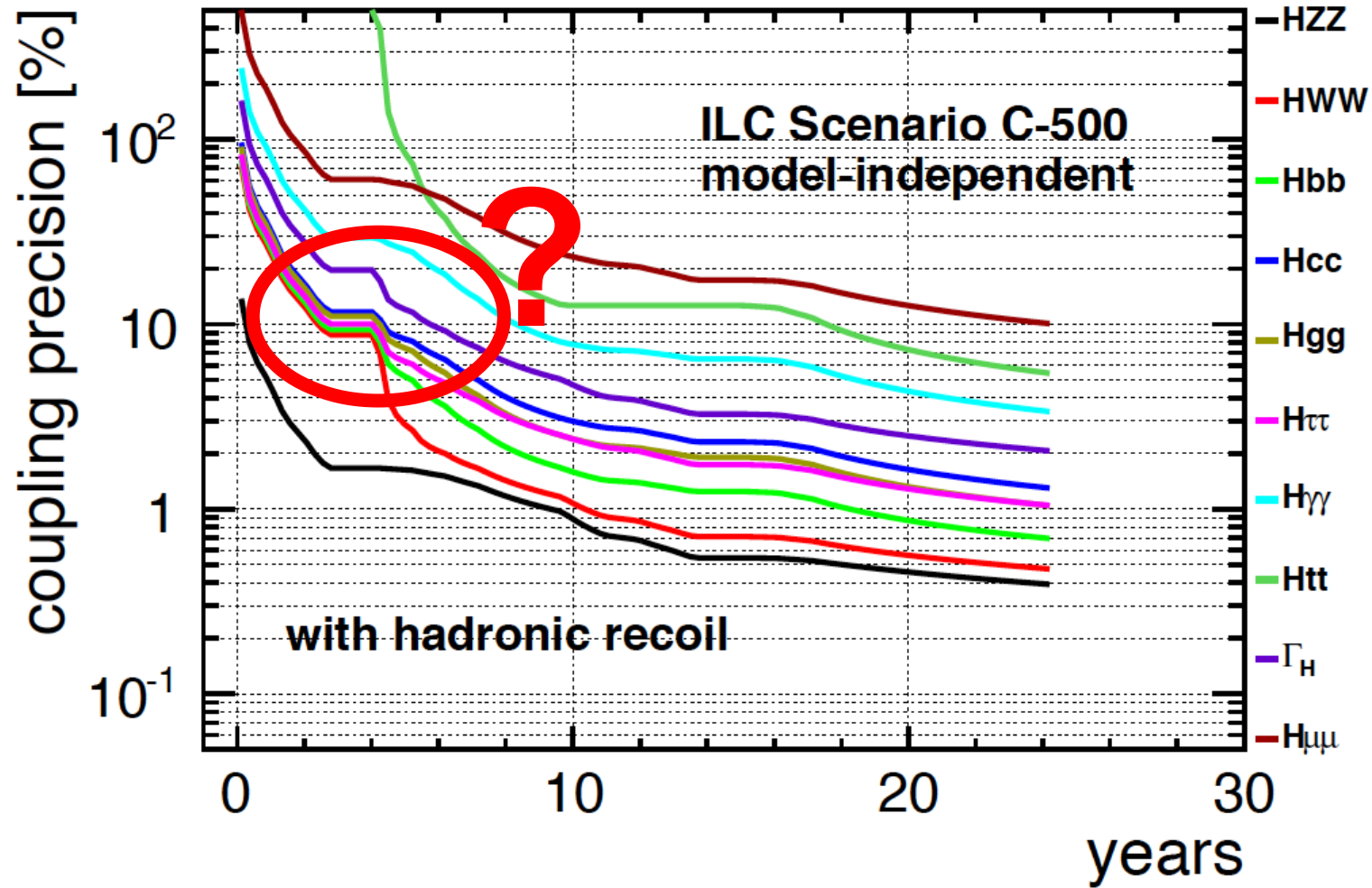
Scenario C-500 – Start 250 GeV



Higgs couplings - B

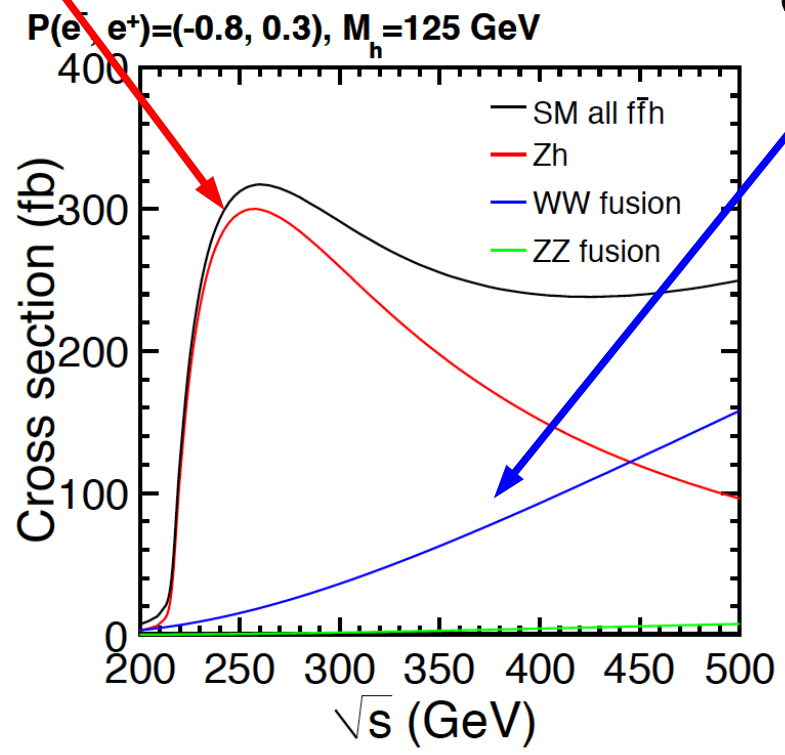
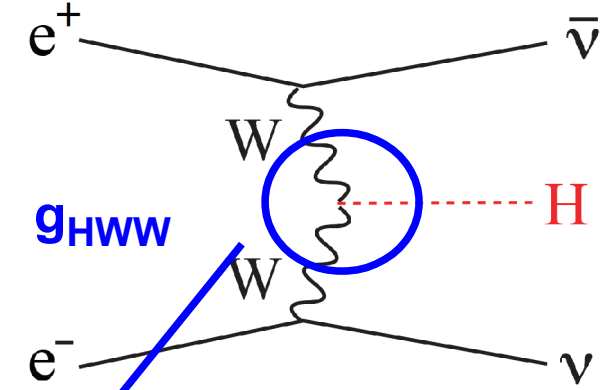
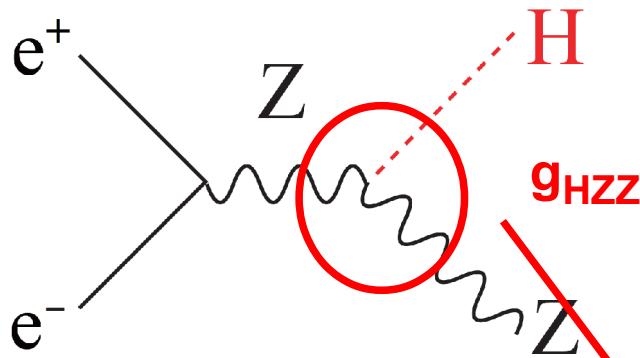


Higgs couplings C-500



When starting at 250 GeV, it is hard to convincing results after eg 5 years

Higgs Production at the ILC (in a nutshell)



- Recoil method:

- g_{HZZ}
- M_H

- WW-Fusion:

- g_{HWW}
- High rates, precision $\sigma \times BR$

Start at 250 GeV vs 350 GeV

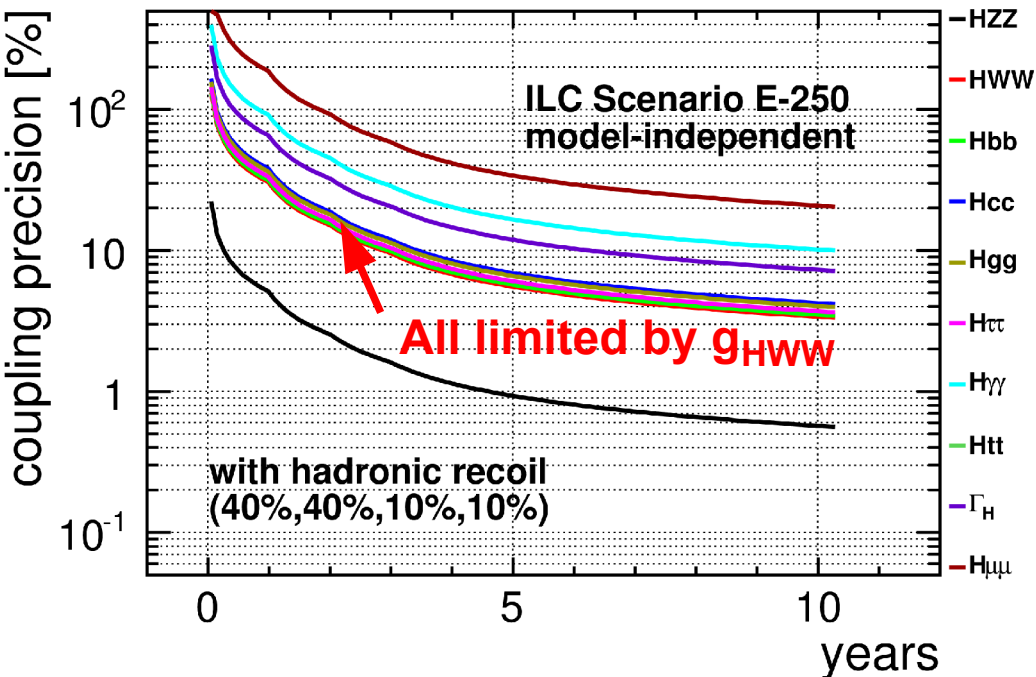
250 GeV is great for σ_{ZH} and m_H , but

- no access to g_{HWW}

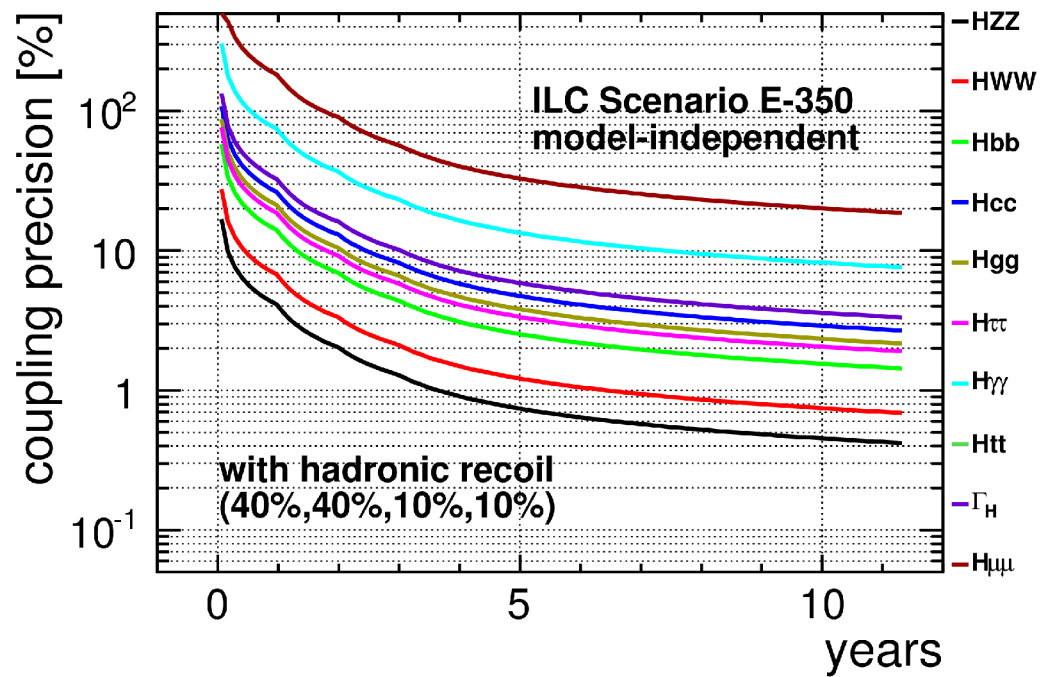
=> limited “early” output (eg after 5 years)

=> new section in report on advantage of starting at 350 GeV

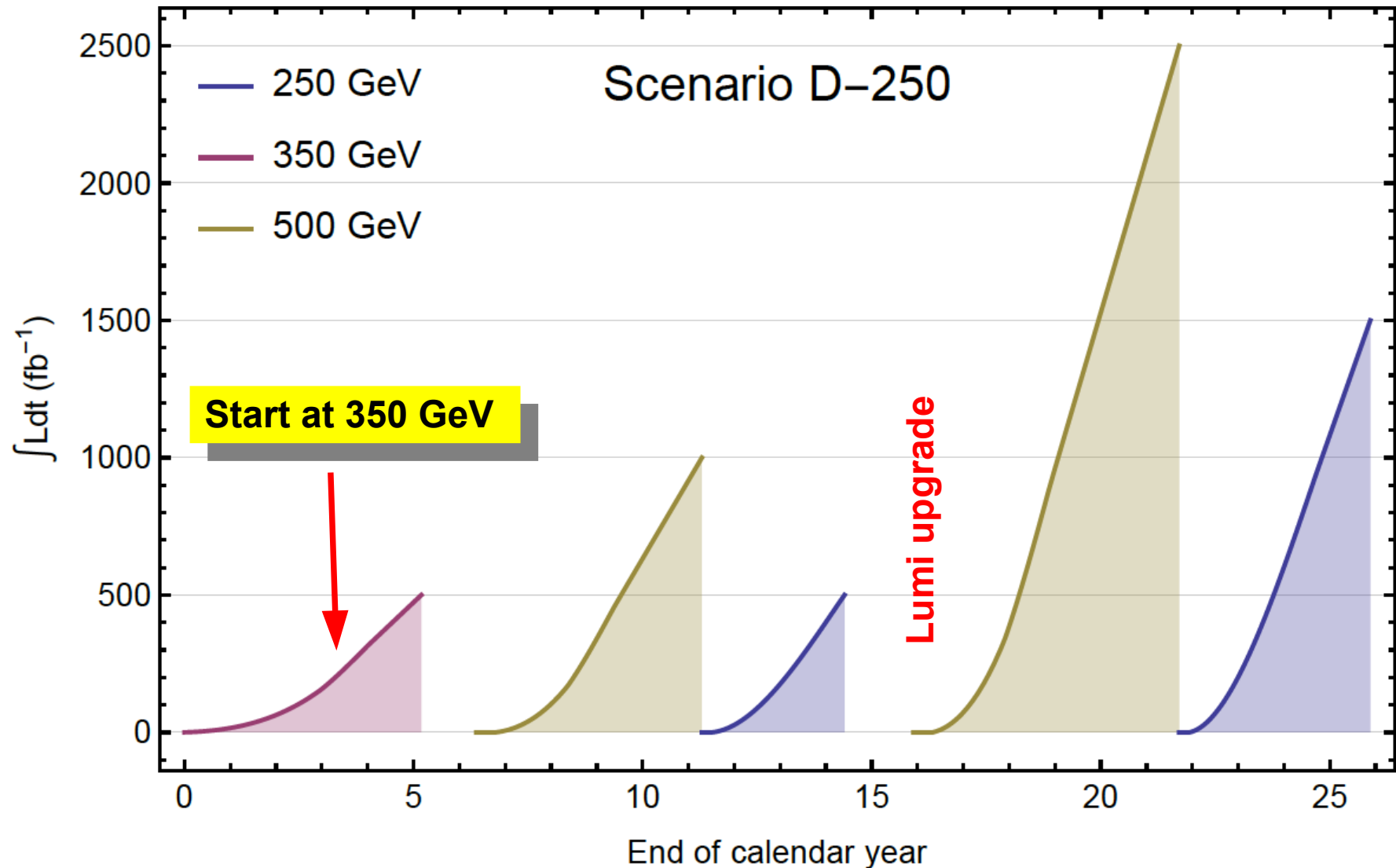
250 GeV ONLY



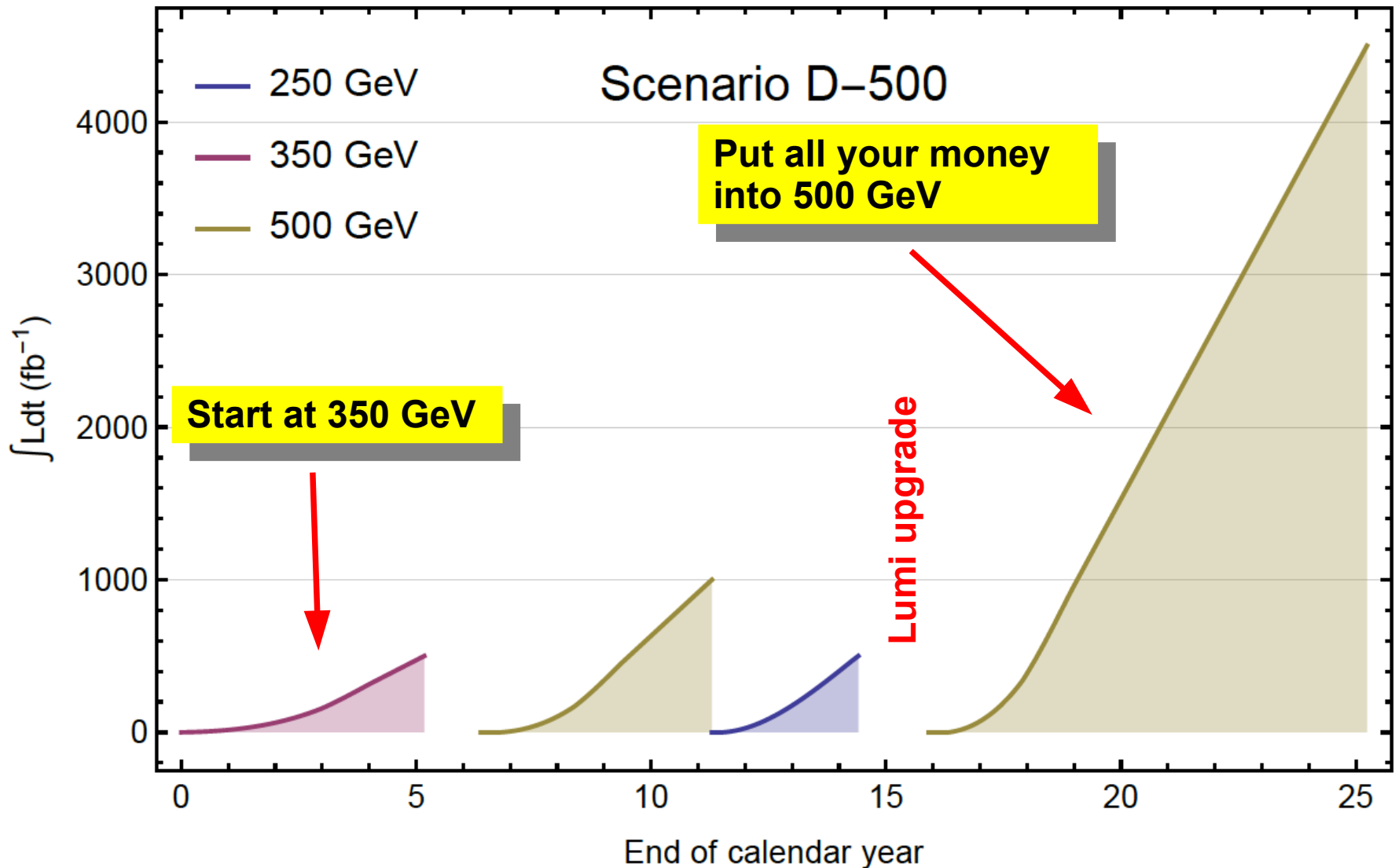
350 GeV ONLY



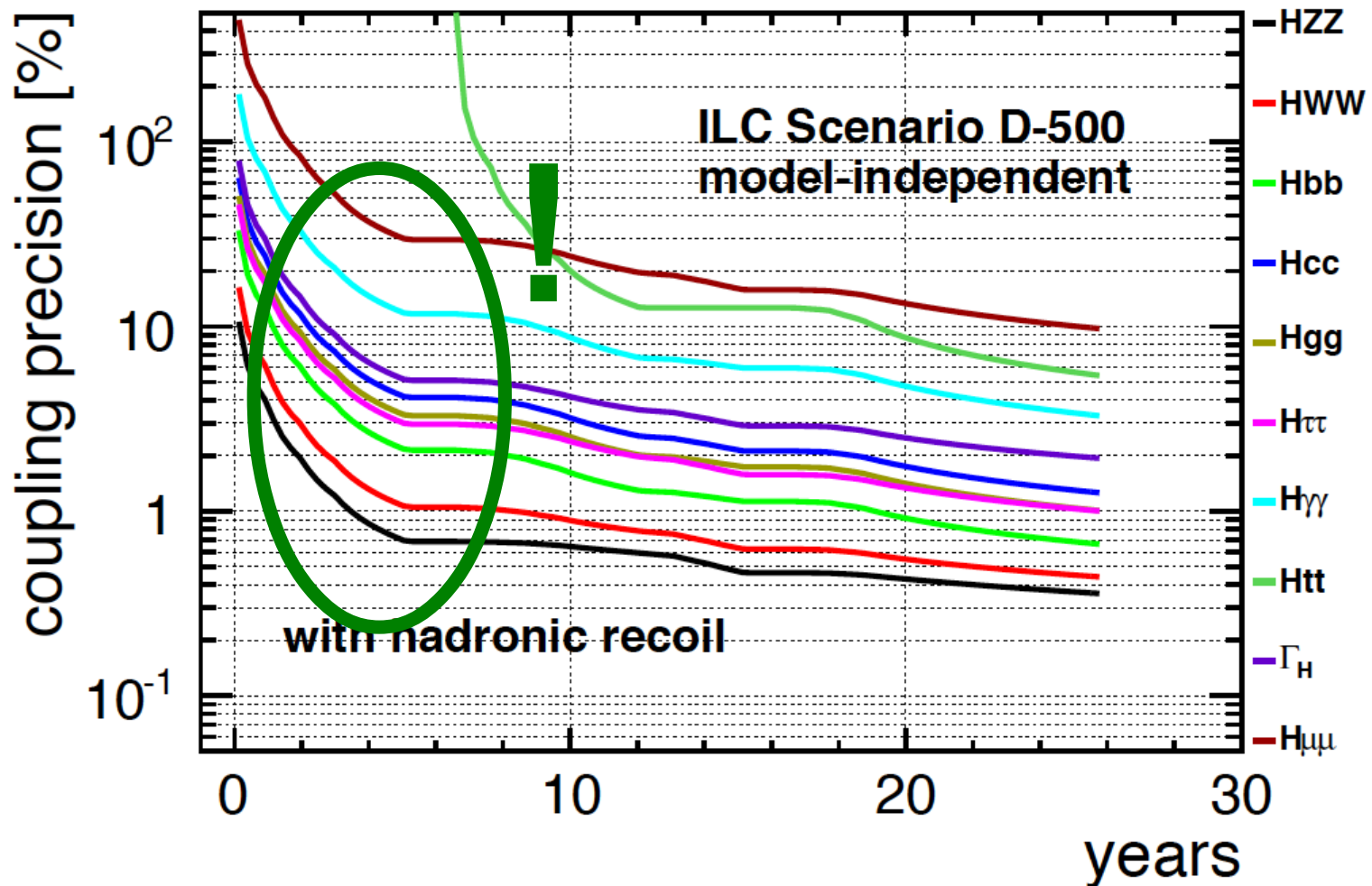
Running scenarios – start at 350 GeV



Running scenarios – start at 350 GeV



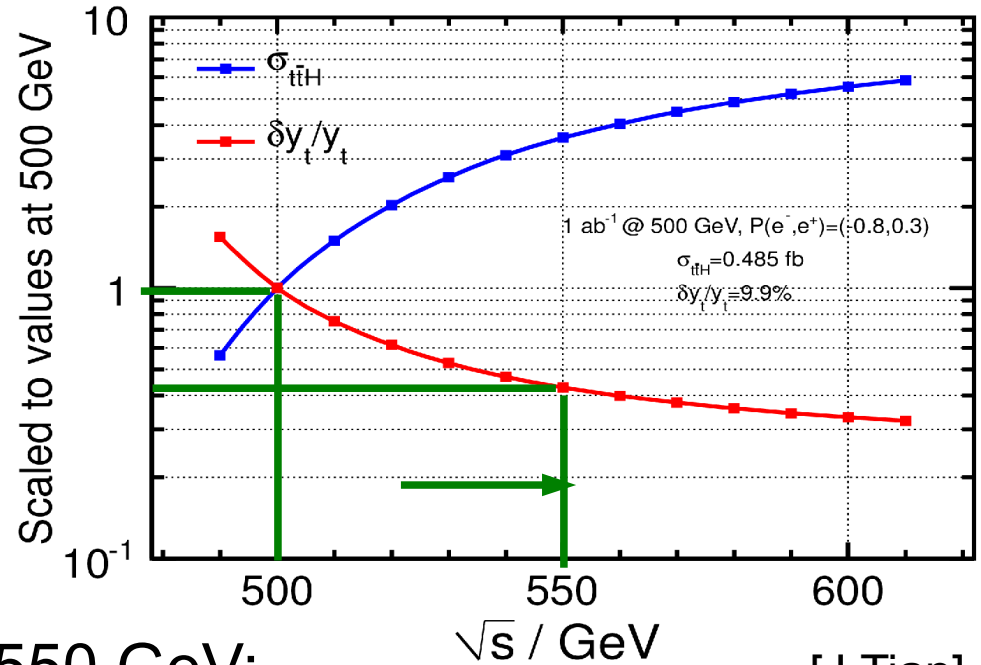
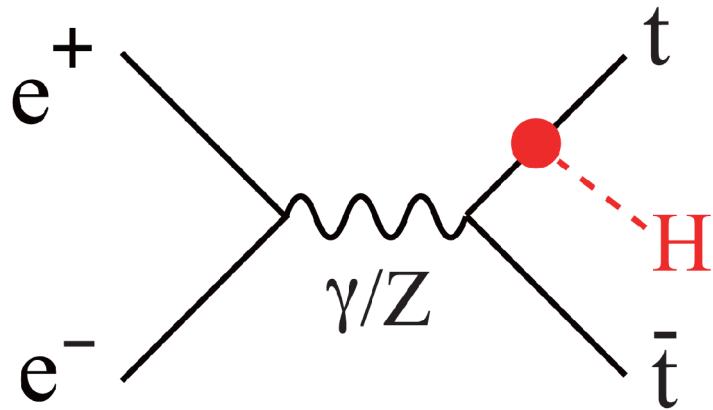
Couplings in D-scenarios



Other Physics Topics

- Top couplings
 - ZHH
 - ttH
 - Triple gauge couplings
 - Direct Searches
- => all want ~500 GeV as soon as possible!

The special case: $y_t = g_{Htt}$



large impact on ttH , 500 GeV \rightarrow 550 GeV:

- σ_{ttH} increases by 3.7, while background decreases
- Coupling precision becomes better by factor ~ 2.4

\Rightarrow seems widely accepted, however will not “rename” ILC500, but hope to provide tunnel length as “safety margin”

Tasks for the Physics & Detector Community

- Specifications for Z pole calibration:
 - Is it needed? How often? How much?
- 10 Hz running:
 - The ILC can run at > 5 Hz when ever ECM is lower than maximum installed energy, eg 10 Hz @ 250 GeV with 500 GeV machine => can the detectors take that?!
- Positron polarisation:
 - Positron source is still a difficult thing
 - Quantify gain of $\pm 30\%$ vs 0% positron polarisation!

... and future

- Today (Sept19): release of revised draft to LCB
.....~30 pages

Further plan:

- End of next week:
make draft public – your chance to read and comment!
- October 8:
1 ½ hour plenary presentation & discussion at LCWS
- again your chance to comment!
- Finalize document by ~end of October (ICFA Seminar)