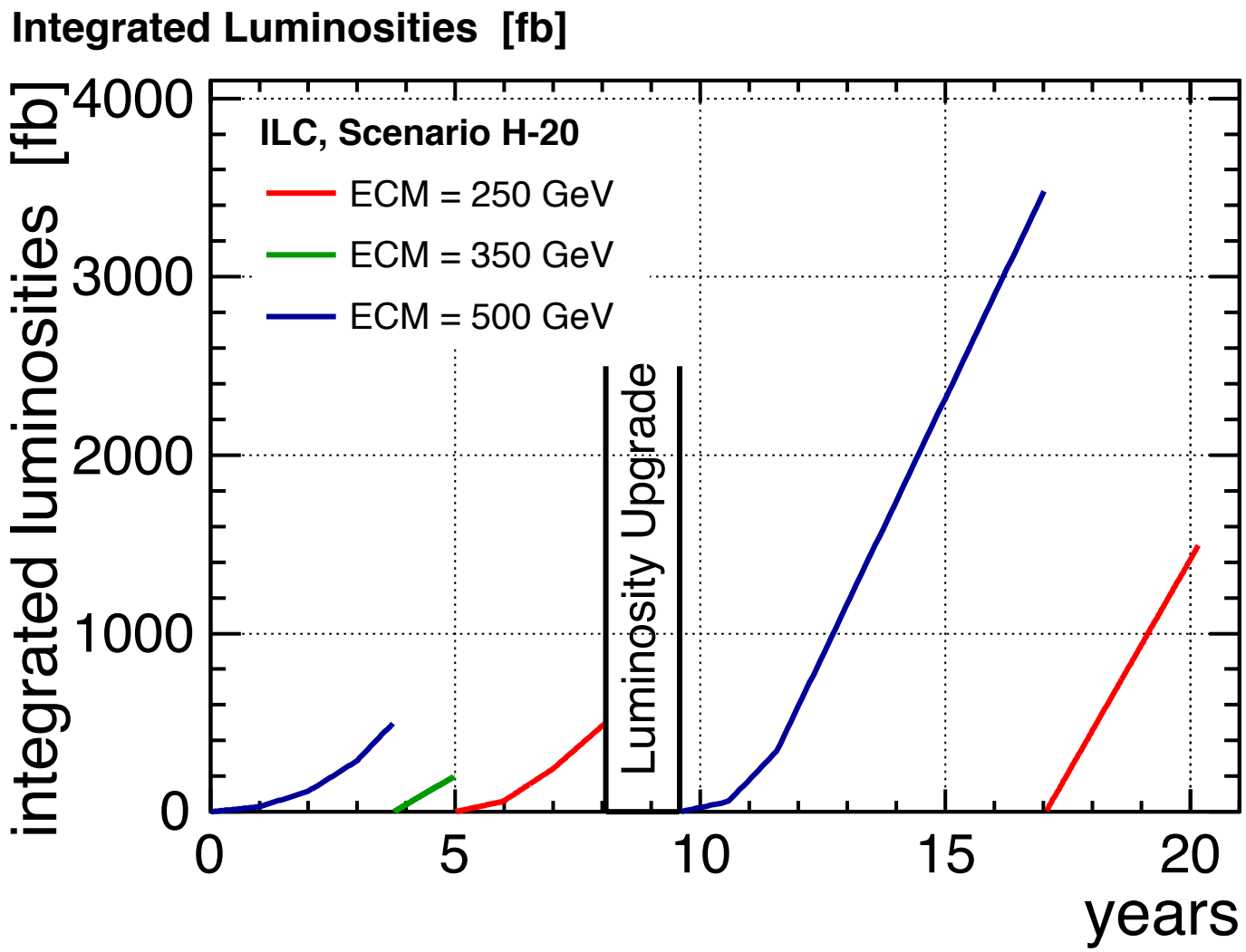
ILC Staging

ILC Parameters Joint WG
January 4, 2017

Staging

- Cost reduction was strong recommendation from discussion at LCWS -> Staging
- Minimal staging:
  - 350 GeV start with 500 GeV tunnel
- Extreme staging:
  - 250 GeV start (retain 500 GeV tunnel)
- We are asked to provide guidance - particularly physics impact - with evolution and comparison to LHC.
- Can we make convincing case for 350 GeV rather than 250 GeV initial phase?



https://arxiv.org/pdf/1506.07830.pdf

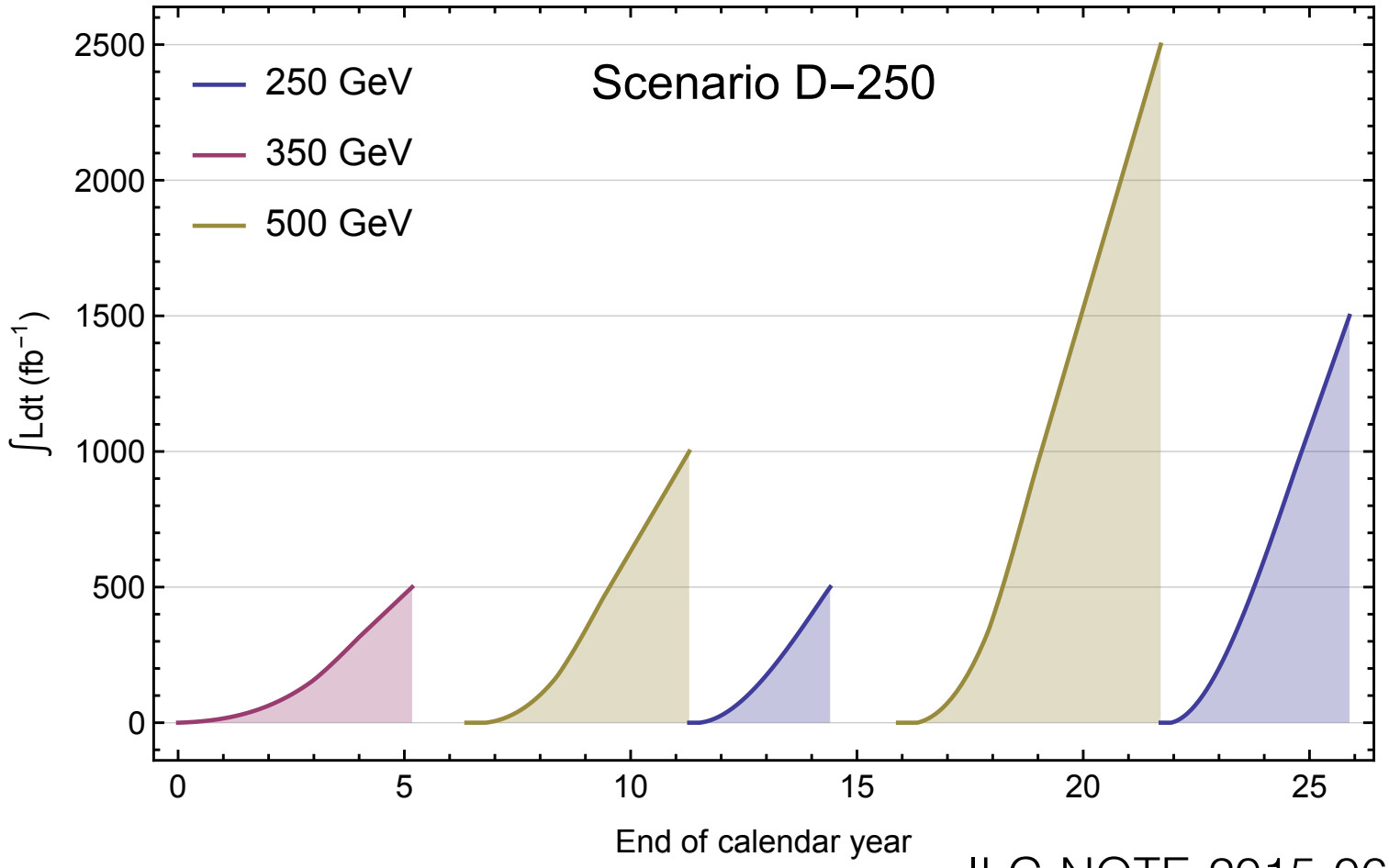
	H-20 start at 500 GeV	B start at 250 GeV	D-250 start at 350 GeV
250 GeV	2000 fb^{-1}	2000 fb^{-1}	2000 fb^{-1}
350 GeV	200 fb^{-1}	200 fb^{-1}	500 fb^{-1}
500 GeV	4000 fb^{-1}	3000 fb^{-1}	3500 fb^{-1}
Total Time	20.2 years	26.6 years	25.9 years
Energy upgrade	-	6.2 years	5.2 years
Lumi upgrade	8.1 years	17 years	14.4 years

https://arxiv.org/pdf/1506.07830.pdf

ILC-NOTE-2015-066

350 GeV start

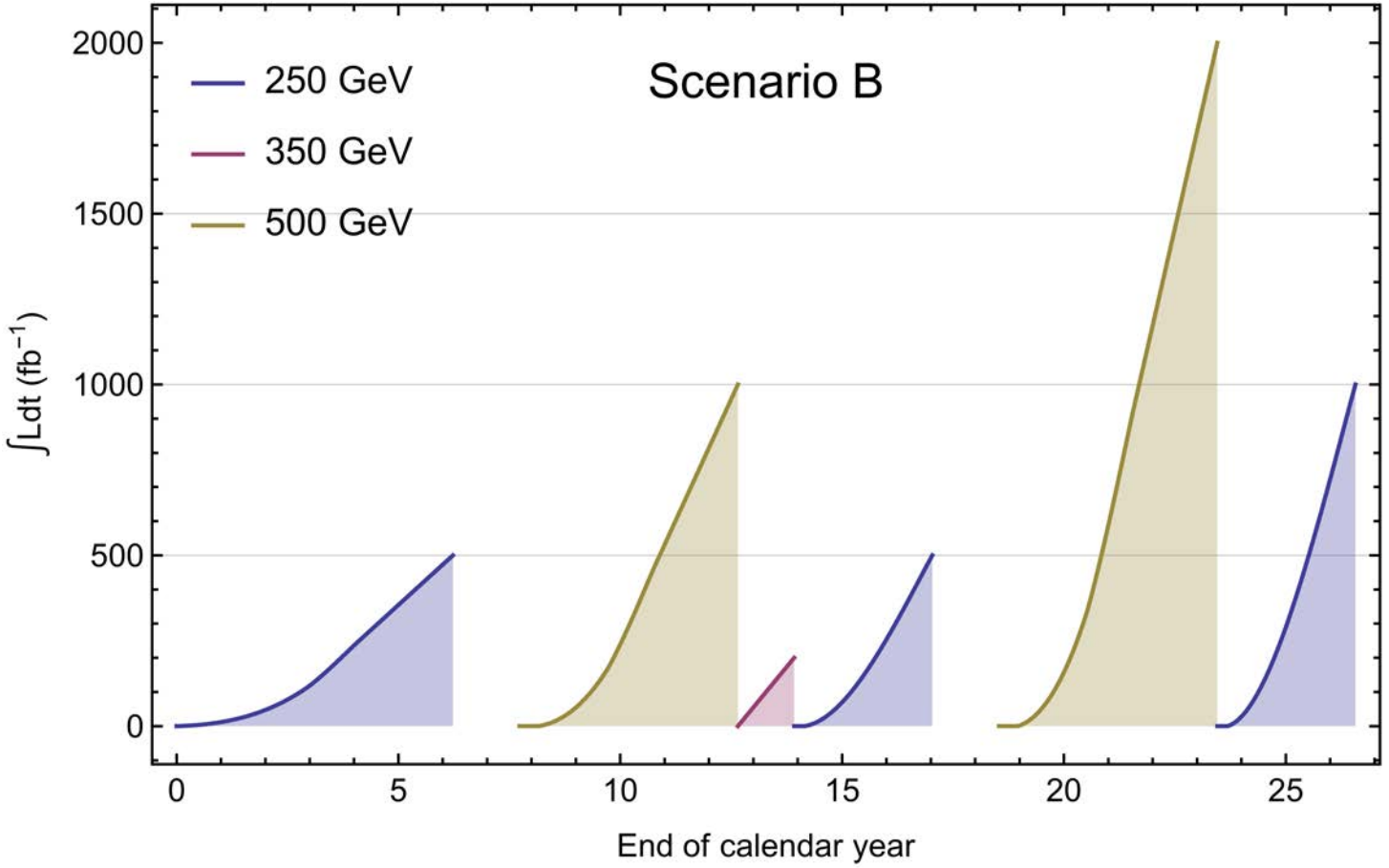
	E_{CM}	$\int Ldt$	L_{peak}	Ramp				T	T_{acc}	Comment
				1	2	3	4			
Physics run	350	500.	1.	10	30	60	100	5.2	5.2	TDR nominal operation at 5Hz
Shutdown								1.2	6.4	Upgrade to full 500 GeV machine
Physics run	500	1000	1.8	10	50	100	100	4.9	11.3	TDR nominal operation at 5Hz
Physics run	250	500	1.5	25	75	100	100	3.1	14.4	Operation at 10Hz
Shutdown								1.5	15.9	Luminosity upgrade
Physics run	500	2500	3.6	10	50	100	100	5.8	21.7	TDR lumi–up at 5Hz
Physics run	250	1500	3.	25	75	100	100	4.2	25.9	TDR lumi–up at 10Hz

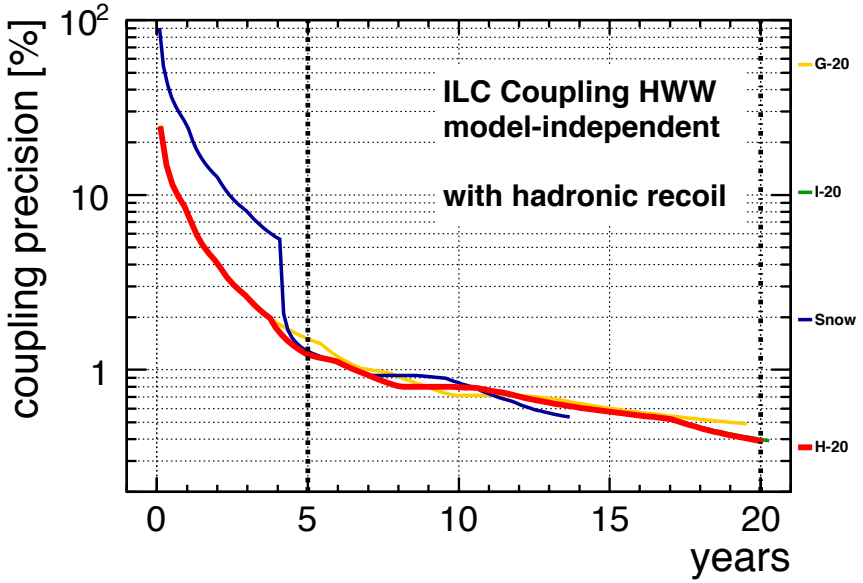


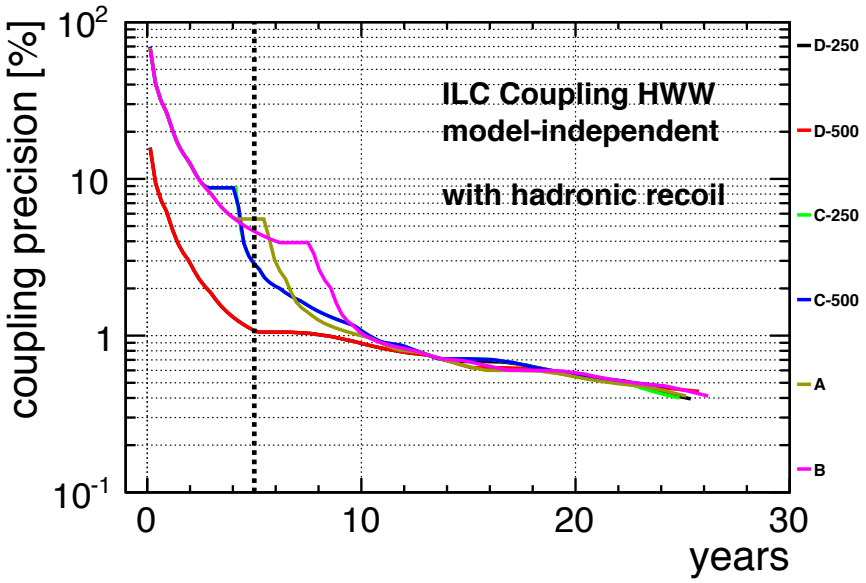
ILC-NOTE-2015-066

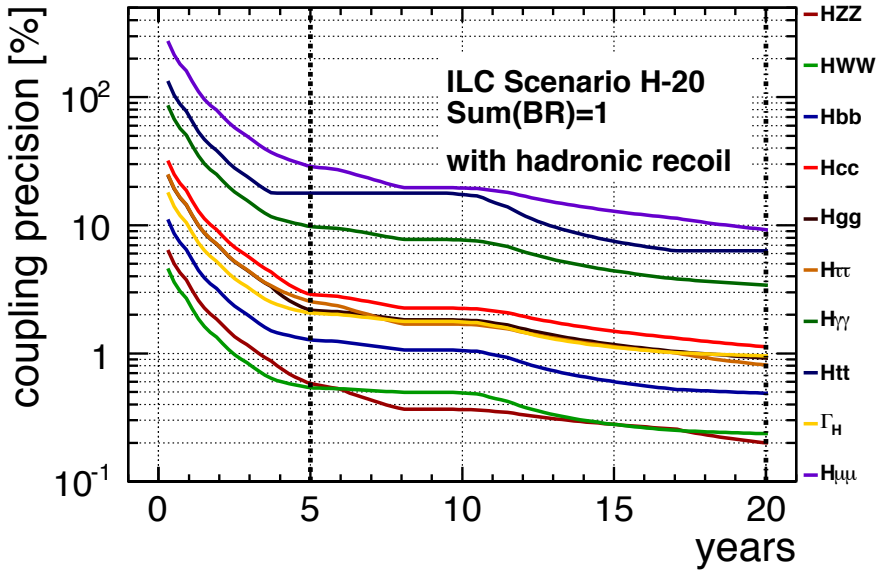
250 GeV start

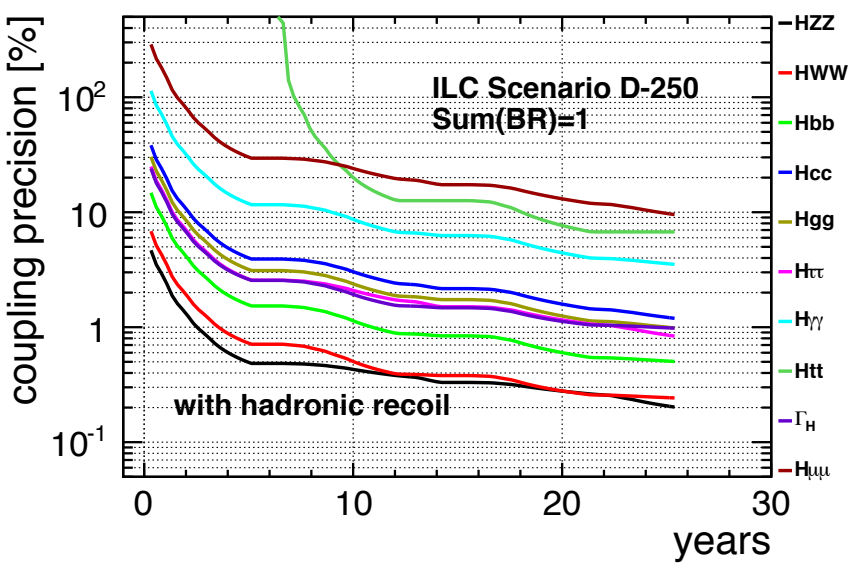
	E_{CM}	$\int Ldt$	L_{peak}	Ramp				T	T_{acc}	Comment
				1	2	3	4			
Physics run	250	500	0.75	10	30	60	100	6.2	6.2	TDR nominal operation at 5Hz
Shutdown								1.5	7.7	Upgrade to full 500 GeV machine
Physics run	500	1000	1.8	10	50	100	100	4.9	12.7	TDR nominal operation at 5Hz
Physics run	350	200	1.	100	100	100	100	1.3	13.9	TDR nominal operation at 5Hz
Physics run	250	500	1.5	25	75	100	100	3.1	17.	Operation at 10 Hz
Shutdown								1.5	18.5	ScenarioComment
Physics run	500	2000	3.6	10	50	100	100	4.9	23.5	TDR lumi–up at 5Hz
Physics run	250	1000	3.	25	75	100	100	3.1	26.6	TDR lumi–up at 10Hz





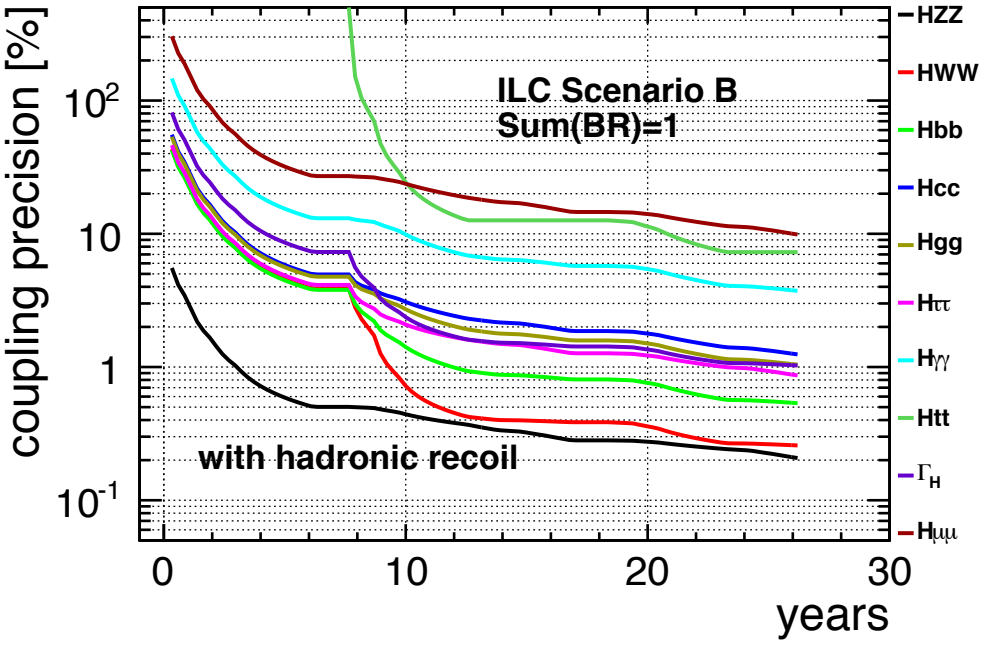




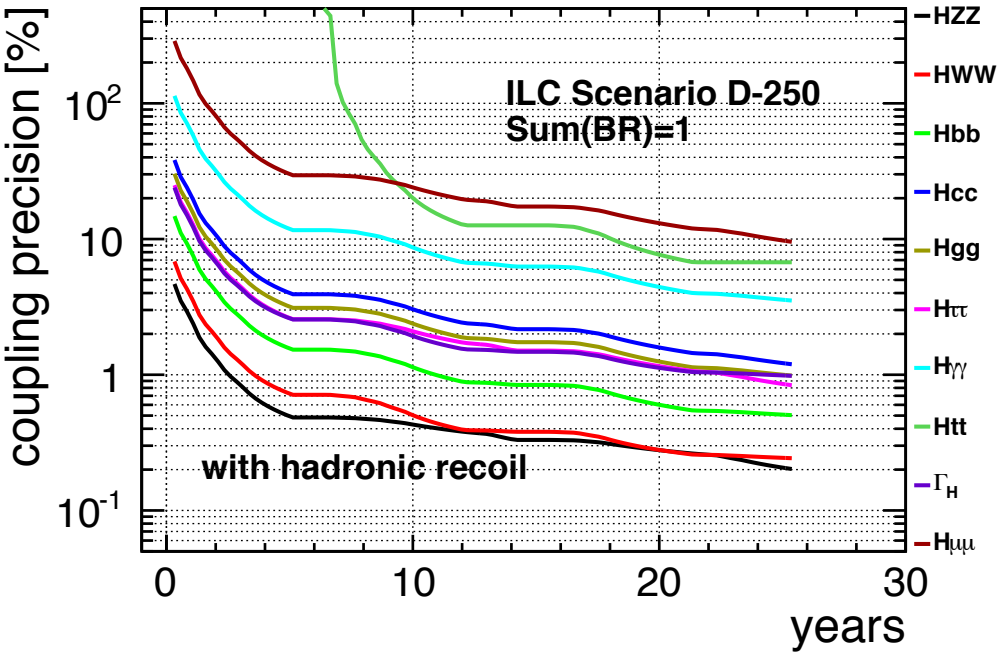


500 GeV start (H-20)

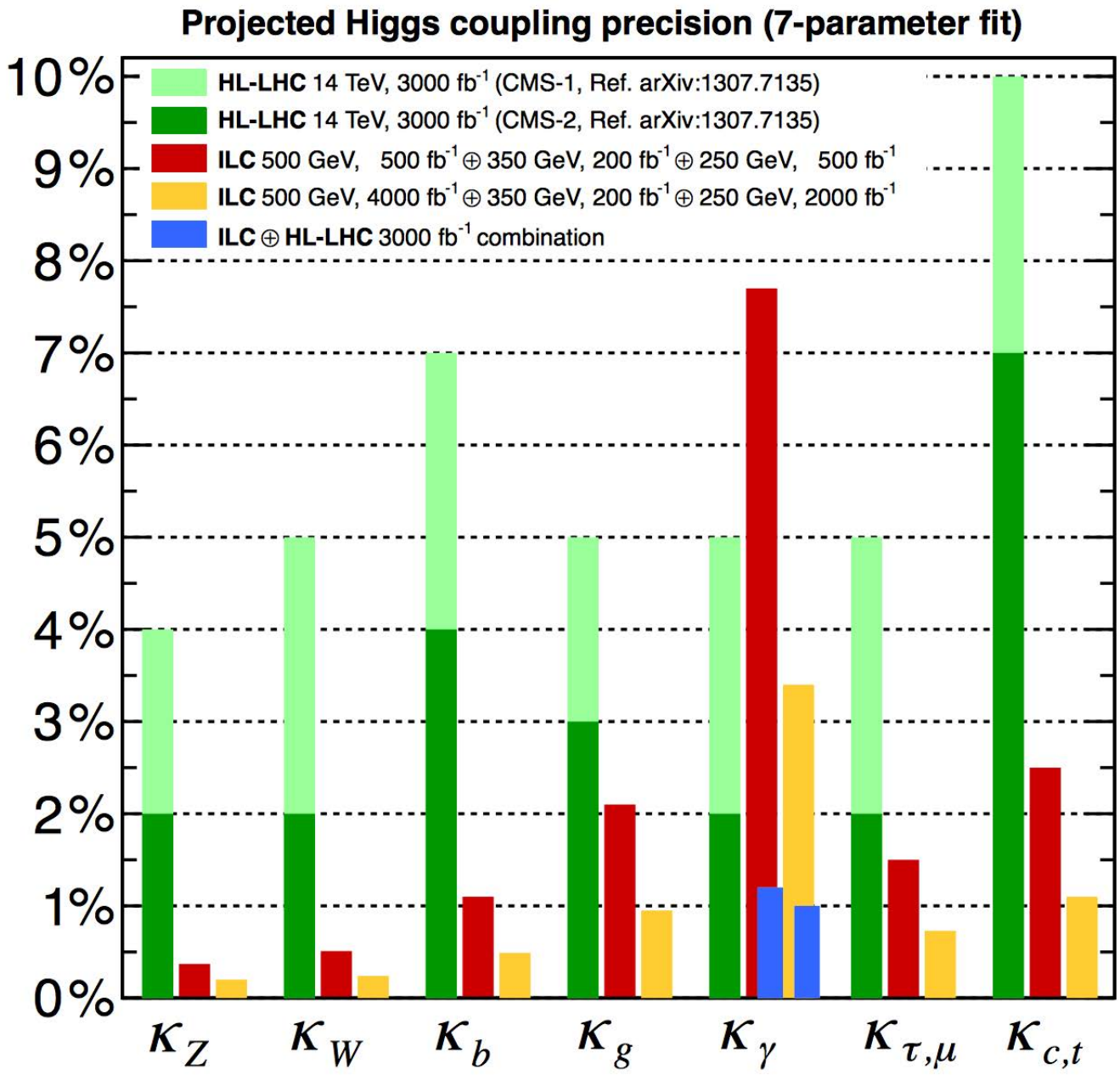
350 GeV start (D-250)



250 GeV start (B)



350 GeV start (D-250)



Is there a useful comparison to LHC for staged ILC (5-10 years)?

LCC Physics Working Group

arXiv:1506.05992 [hep-ex]

Possible next steps

- Goal - updated analysis for ICFA meeting - Feb 16?
- Review models for initial energy, timing of energy steps and upgrade timing
  - start at 350 GeV, energy upgrade, lumi upgrade
  - start at 250 GeV, energy upgrade, lumi upgrade
- Compare evolution of couplings
  - model-independent and model-dependent
  - compare to LHC