

What kind of physics I am doing

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Why NP at the EW scale?

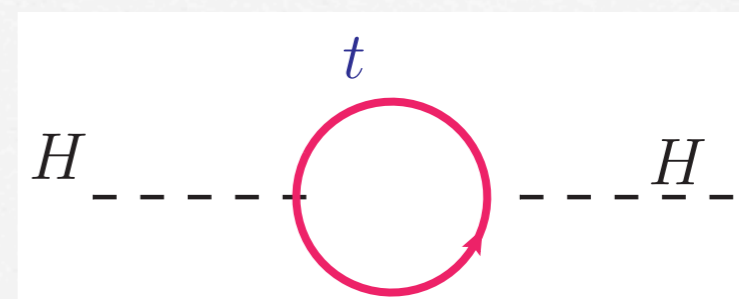
The SM is a self-consistent theory, which can be extrapolated to very high scales.

NP at the LHC: no promise, only hopes

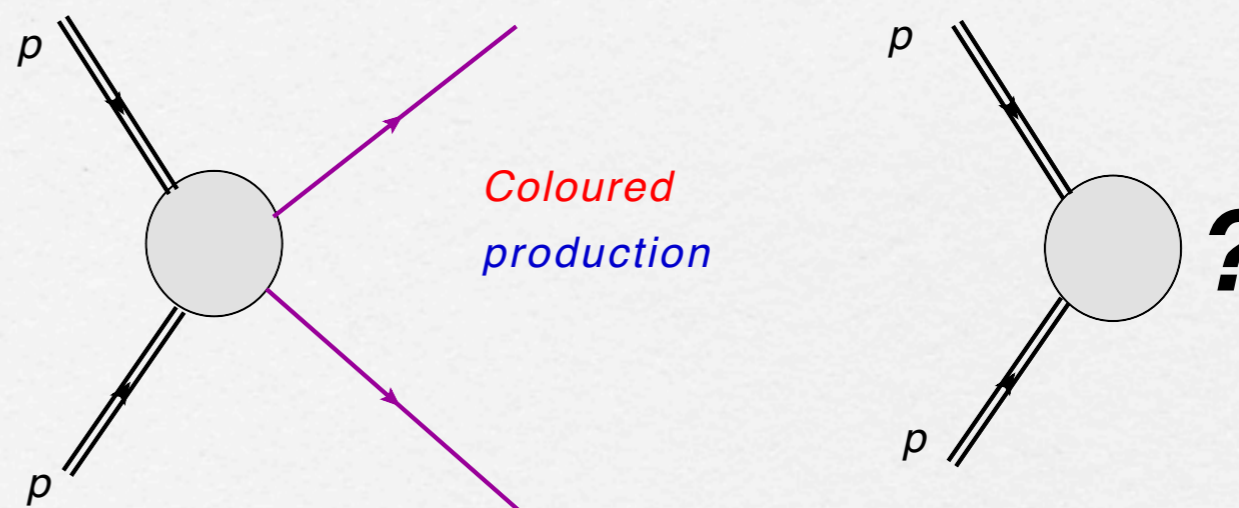
- The SM is fine tuned. No fine tuning - new physics at the EW scale. Will we be see it at the LHC? Maybe.
- The DM is here. Is there any hint for the EW scale? WIMP miracle, but lots of other ideas are equally plausible. The signal might come from various experiments.
- The SM cannot explain the baryon asymmetry of the universe. EW baryogenesis is still possible with "small fixes": 1st order PT, extra CP violation. This option is cornered (EDMs), but not excluded. If EW baryogenesis is correct, this implies new states which couple strongly to the Higgs. Can we see this in Higgs precision measurements?

Naturalness

The most important problem
(for the little hierarchy):



	colored	uncolored
spin 0	SUSY	"folded SUSY"
spin 1/2	compositeness	"twin Higgs" ??



What are the signatures of
the uncolored top partners?

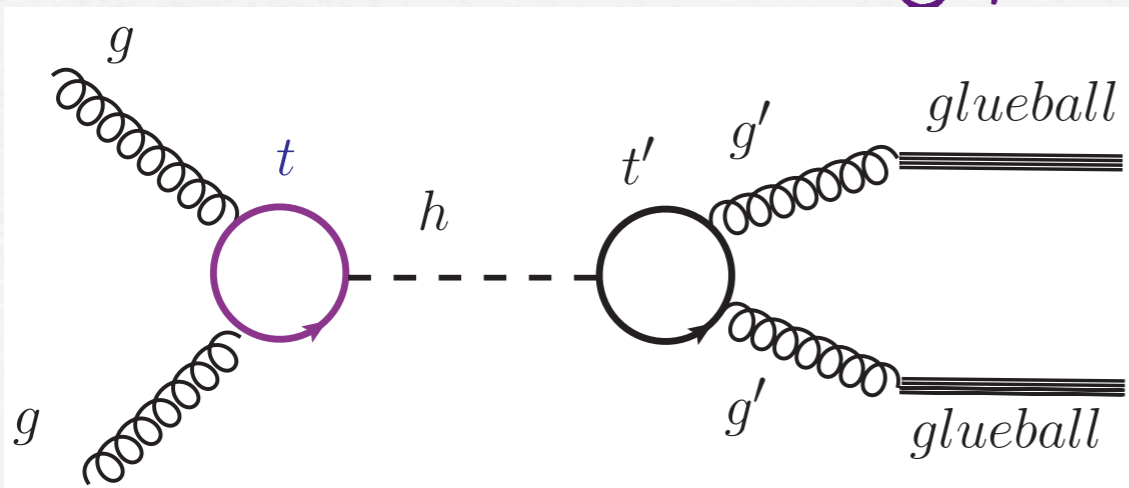
Signatures of the “twin Higgs”

Project w/ N. Craig, M. Strassler and R. Sundrum

Basic ideas:

- ★ Higgs is a pGB of $SU(4)/SU(3)$. Two Higgses are required - our Higgs and the twin.
- ★ Need “twin tops” to couple to the twin Higgs.
- ★ Need (almost) exact Z_2 between the twin sector and the visible one.
- ★ To avoid breakdown of Z_2 at the EW scale, must gauge hidden $SU(3)$ - twin confinement

Higgs is the only portal to the hidden sector:



Signature: exotic Higgs decays. 0^{++} glueball decays through the Higgs mixing into b 's or taus. Displaced vertices, maybe decays outside the tracker.

EW baryogenesis - SUSY

Project w/ M. Perelstein, M. Ramsey-Musolf, P. Winslow

MSSM: was a nice way to realize EW baryogenesis

1. Coupling to the light stop might trigger strong 1st order EWPT
2. Can have new sources of CPV from EW-inos and/or degenerate scalars (sbottoms, staus)

After the Higgs discovery MSSM triggered EW baryogenesis is excluded.

The exclusion heavily relies on the fact, that MSSM tells us what is the stops scale.

What is left if we remove stop mass constraint?

- Will need a sizable stops mixing to avoid large contributions to hgg.
- Getting very light stops is hard due to direct constraints
- Having the second stop light can still be dangerous due to direct constraints

??

Short CV

- 2008 - Ph.D. from the Technion, Israel.
- 2008-2011 Postdoc at the University of Maryland
- 2011-2014 Postdoc at Harvard
- 2014-... 5-years position at CERN and UNIGE.
- Interests: BSM physics: LHC phenomenology, DM, baryogenesis, SUSY (still alive).