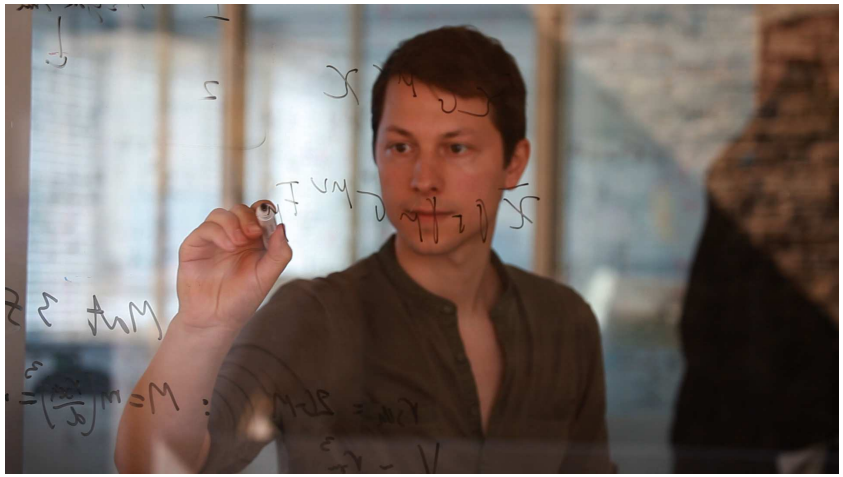
Kai - who is this guy?

Kai Schmidt-Hoberg



CERN Introduction

...where do I come from...

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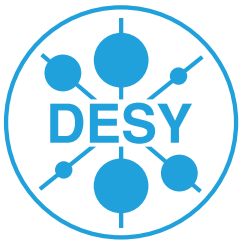
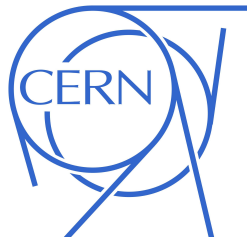
My scientific life in a nutshell:

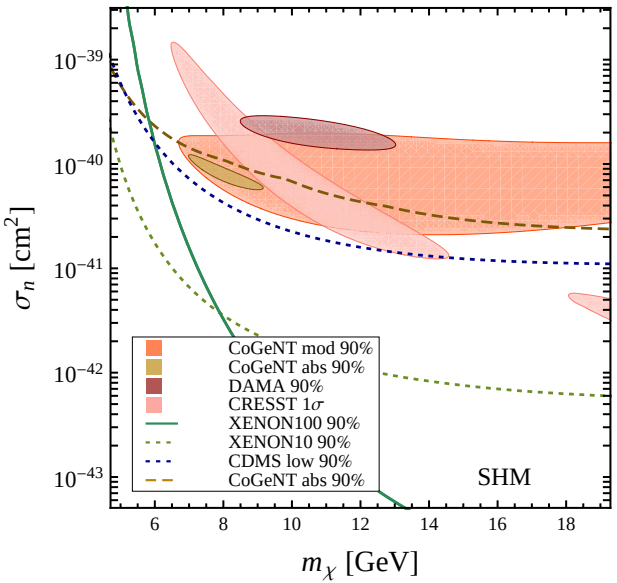




...now here at CERN... thanks for having me!

Current Interests

- Dark matter
  - Recent hints for light dark matter?
  - Can all hints be made compatible by changing particle physics/astrophysics?



- (SUSY) phenomenology
  - Higgs finally found! $\Rightarrow$ the hierarchy problem exists!?
  - The Higgs mass is 125 GeV !

The GNMSSM

The GNMSSM: mainly with Graham Ross and Florian Staub

$$\mathcal{W}_{\text{GNMSSM}} = \underbrace{\mathcal{W}_{\text{Yukawa}} + \lambda S H_u H_d + \frac{1}{3}\kappa S^3}_{\text{NMSSM}} + \mu H_u H_d + \frac{1}{2}\mu_s S^2$$

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- does not look very clever...
- but: underlying R symmetry which
  - solves the (double) μ problem
  - forbids/suppresses dimension four and five proton decay operators
  - commutes with GUTs
  - allows the Weinberg operator
  - solves the domain wall and tadpole problems of the NMSSM

Additional tree-level contribution to Higgs mass:

$$M_Z^2 \cos^2(2\beta) + \lambda^2 v^2 \sin^2(2\beta) + \text{radiative corrections}$$

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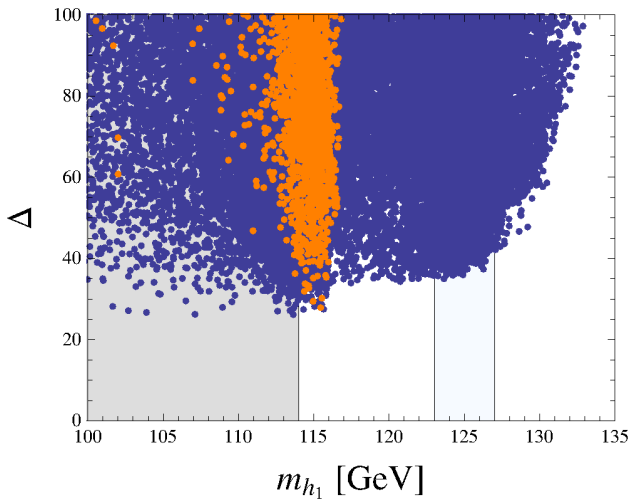

- Low fine-tuning requires small $\tan\beta$ and large λ!
- Other implications of this parameter region?

Enhanced diphoton rate?

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  At least for another 5 days...
- Two easy options:
  - suppress partial width into bb to increase BR
  - light charged particles in the loop to increase partial width into $\gamma\gamma$
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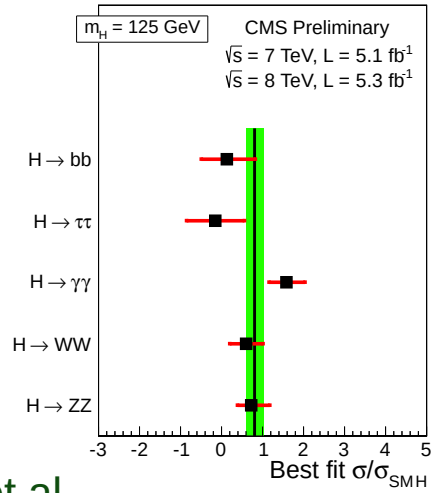
- needs very large $\mu \cdot \tan\beta \Rightarrow$ unnatural, danger of CCB vacuum
- what about $H^{\pm}$ or $\chi^{\pm}$?



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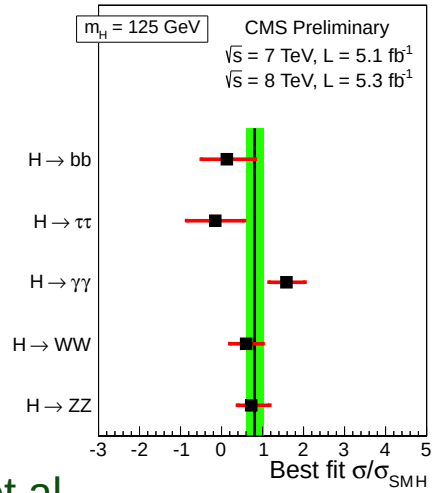
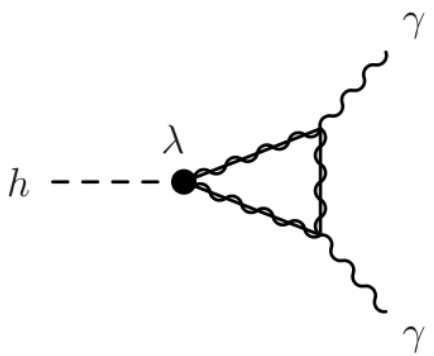
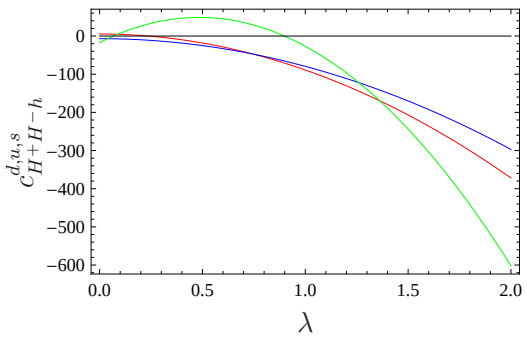
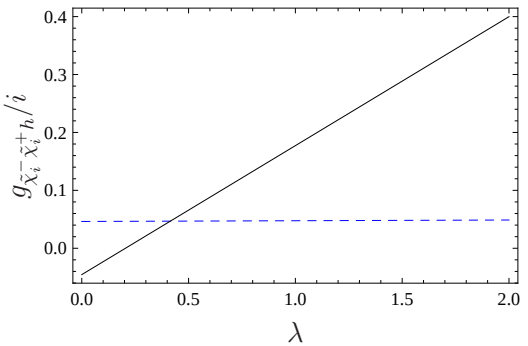


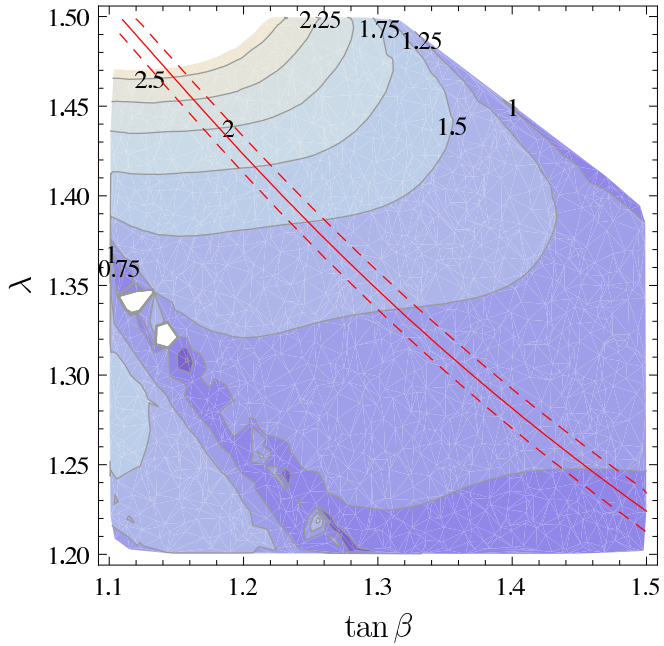


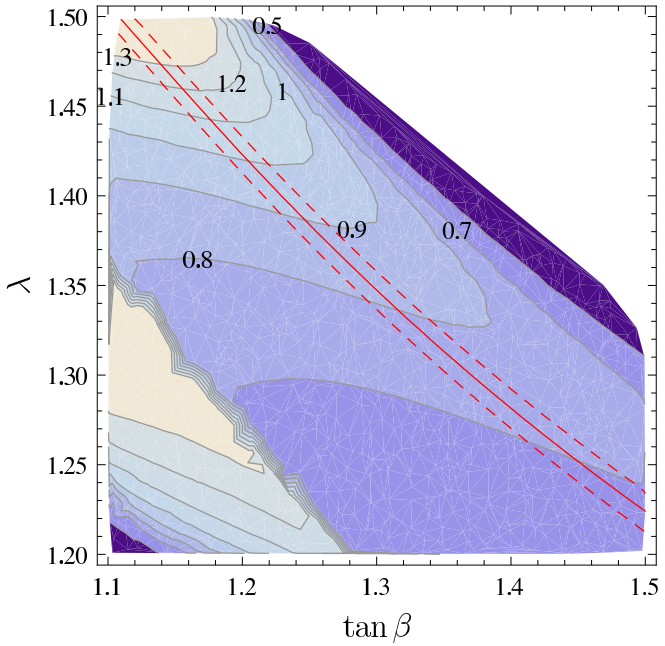




Full Analysis

- take into account the Higgs mass, production cross section, ...

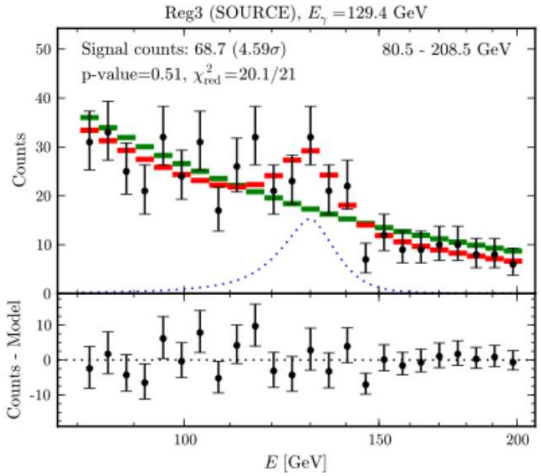




- Enhancement of the diphoton signal by a factor 2 with SM like WW, the correct Higgs mass etc. possible

Fermi LAT

- DM annihilation at Fermi?



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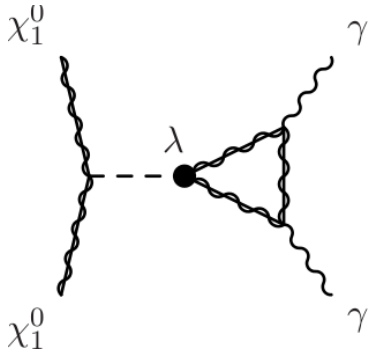

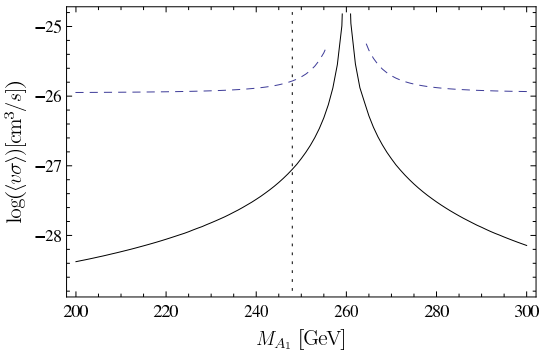

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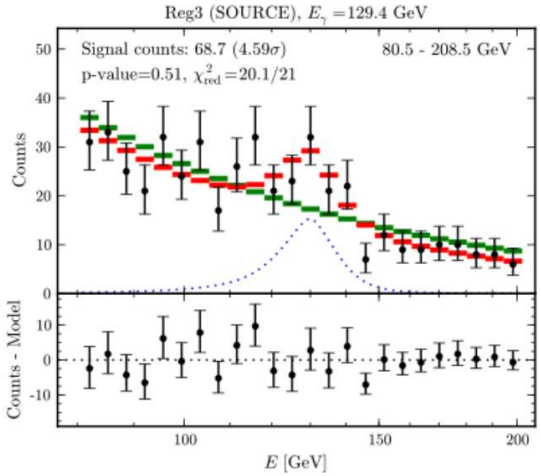

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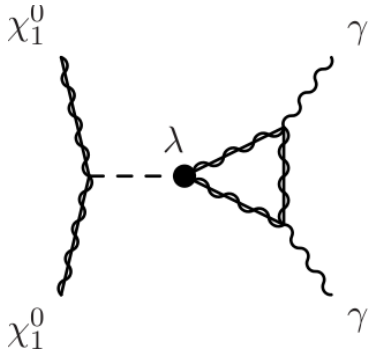

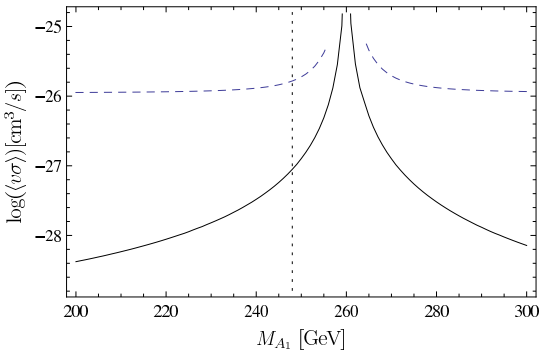

Thank You!