Higgsless Models

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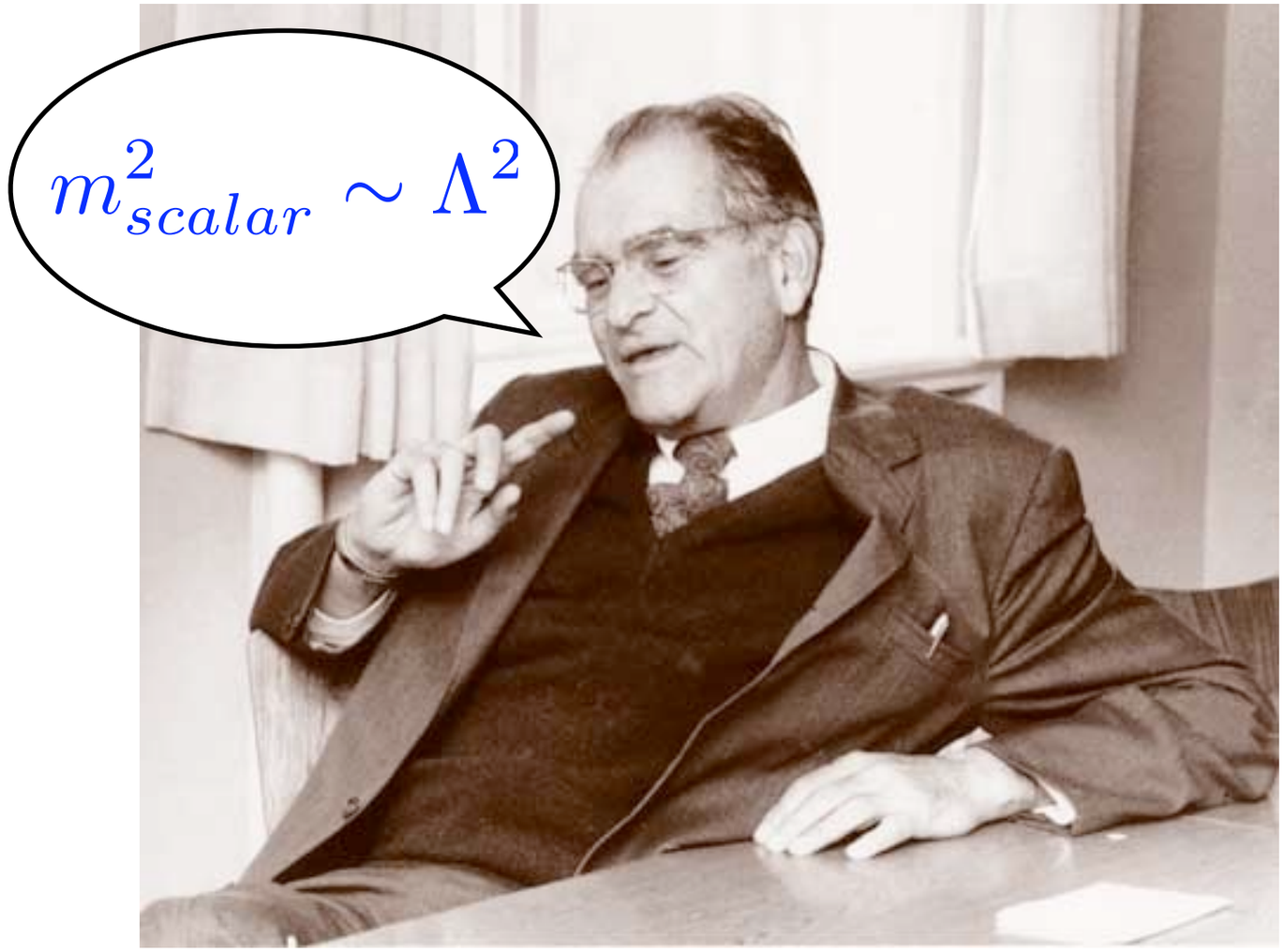
Outline

- Motivation
- 5D: Higgsless/Gaugephobic/Unhiggs
- 4D Models: Monopoles
- Conclusions

What's the problem?

Weisskopf Phys. Rev.56 (1939) 72

What's the problem?



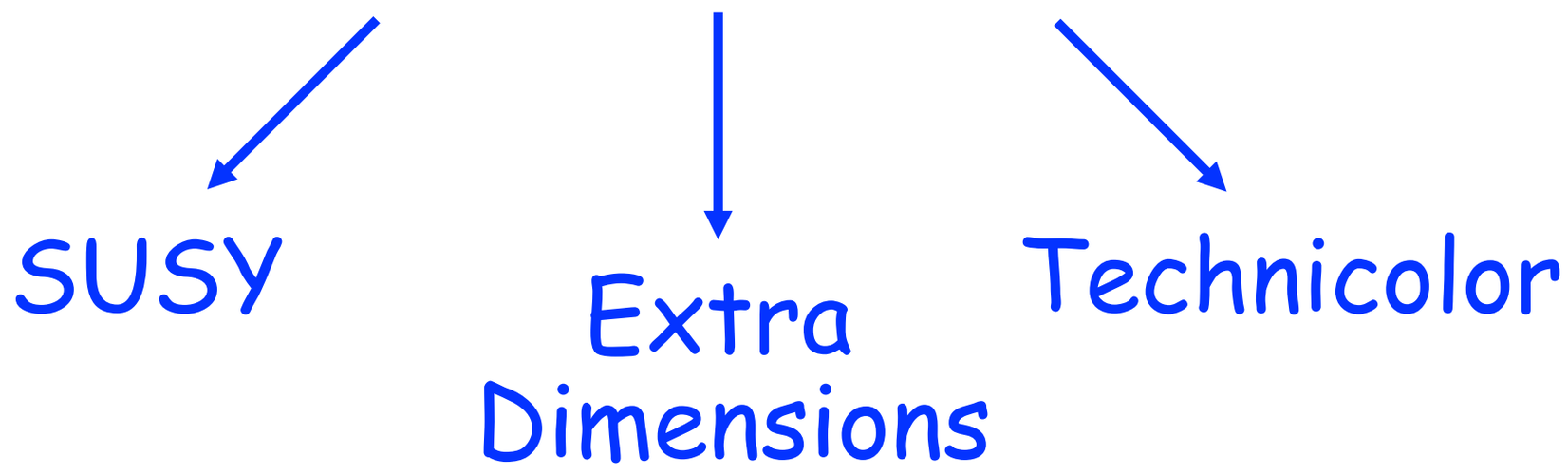
Weisskopf Phys. Rev.56 (1939) 72

Hierarchy Problem Now

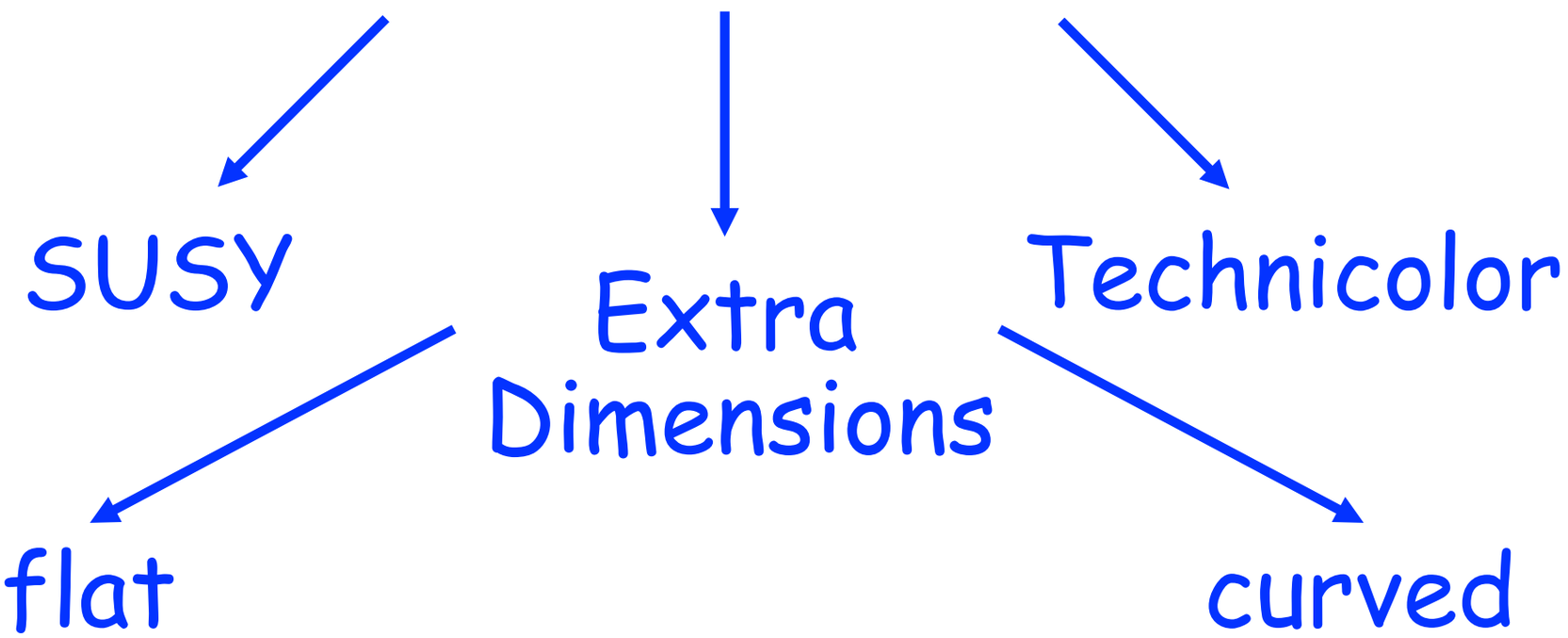
SUSY

Technicolor

Hierarchy Problem Now



Hierarchy Problem Now



Hierarchy Problem Now

SUSY

Extra Dimensions

Technicolor

flat

small

large

discrete

Little Higgs

curved

composite Higgs

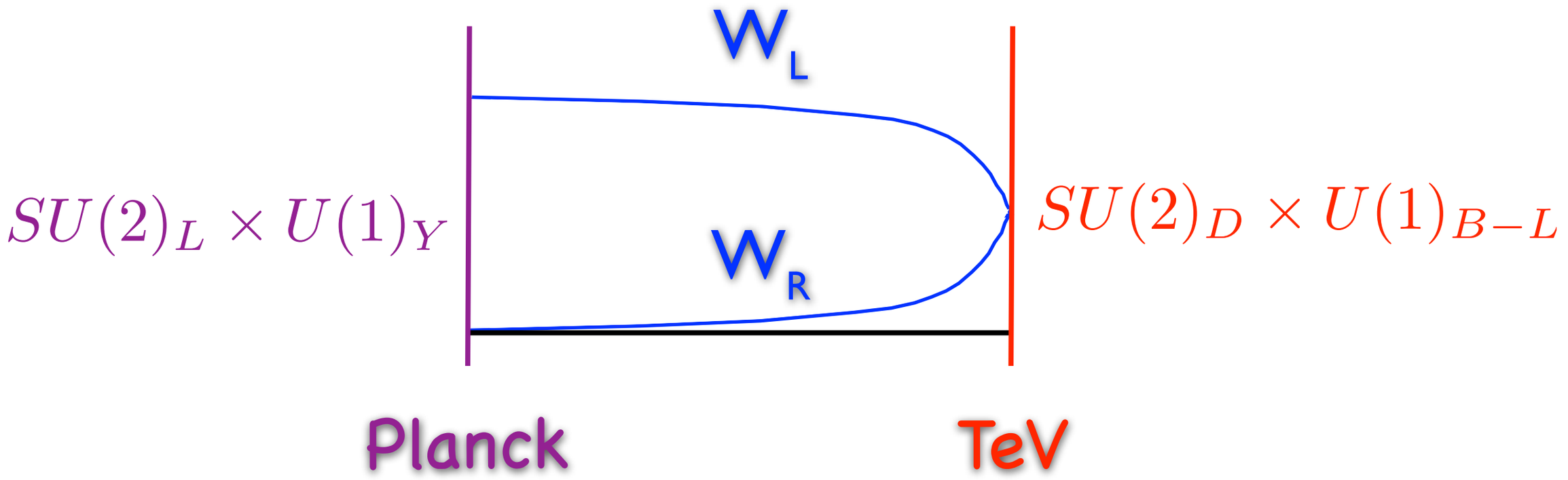
RS

gaugephobic Higgs

Higgsless

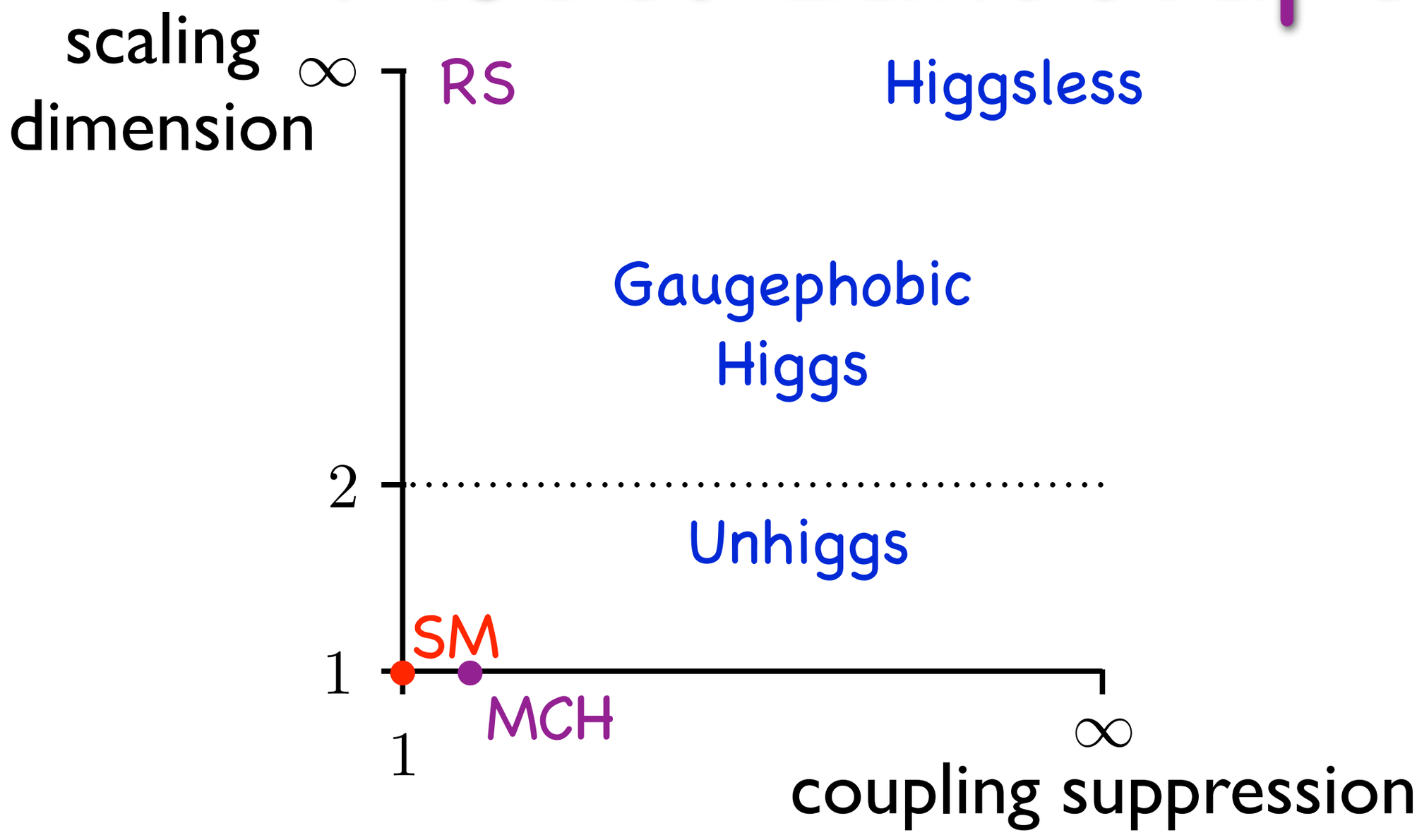
Going Higgsless

$$SU(2)_L \times SU(2)_R \times U(1)_{B-L}$$



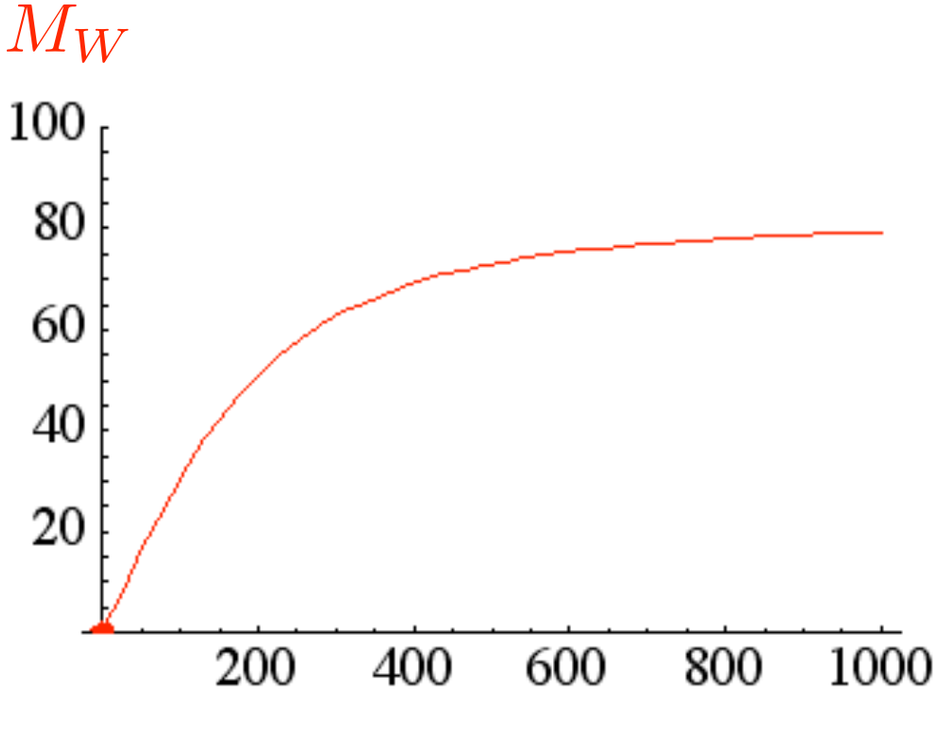
hep-ph/0305237, hep-ph/0308038

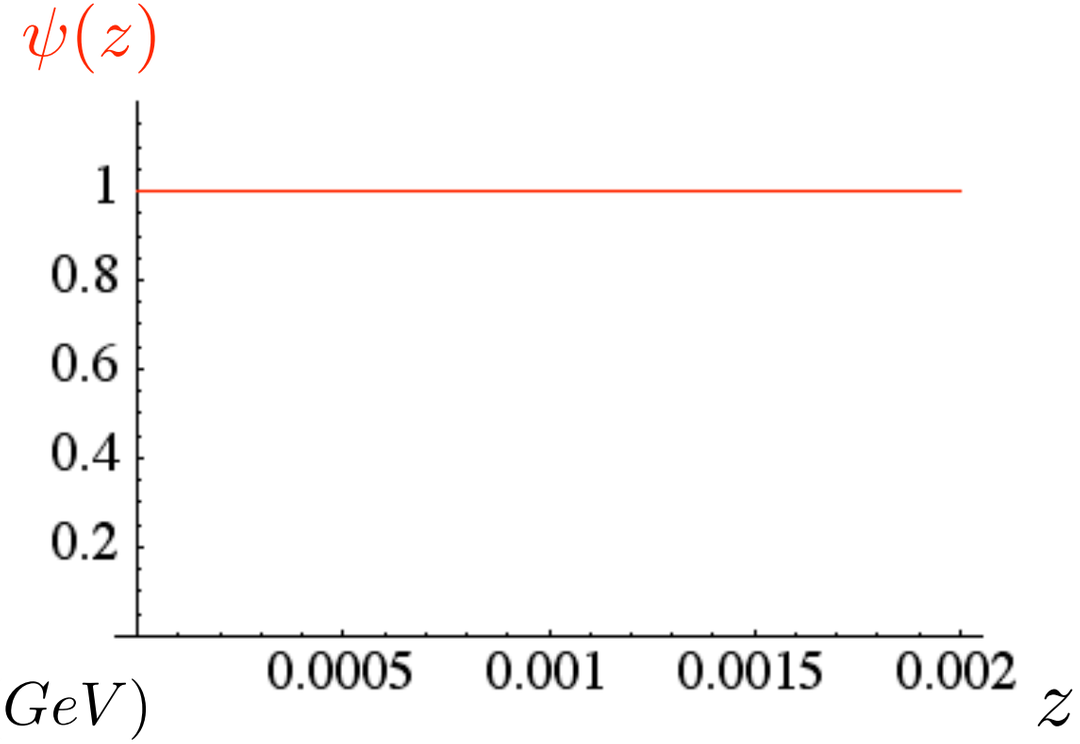
Model Landscape



Higgs on a boundary

$$\partial_z \psi(z) = -\frac{g_5^2 v^2}{2} \psi(z)$$





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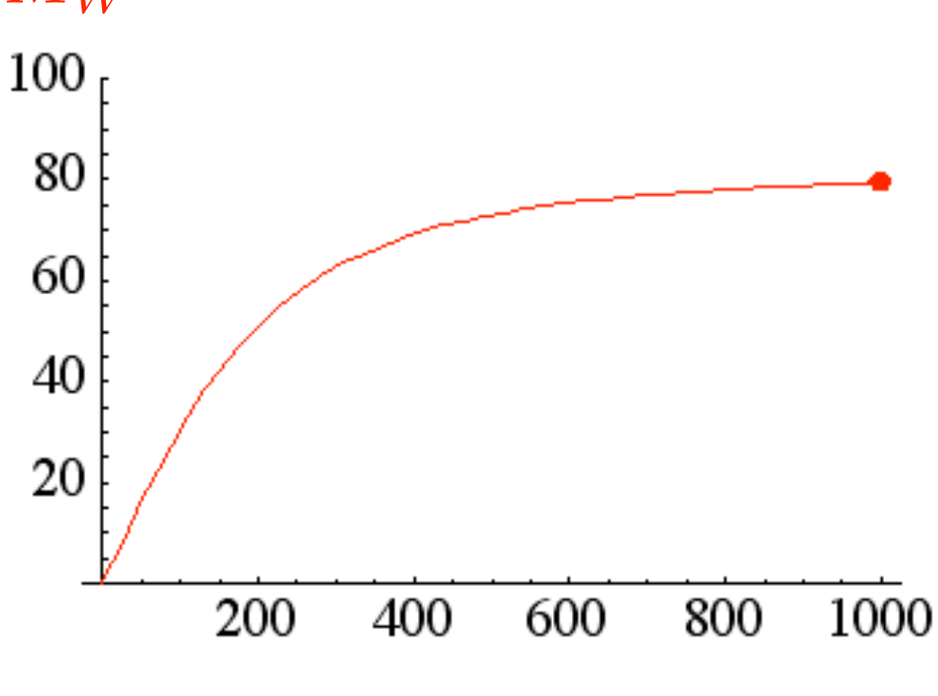
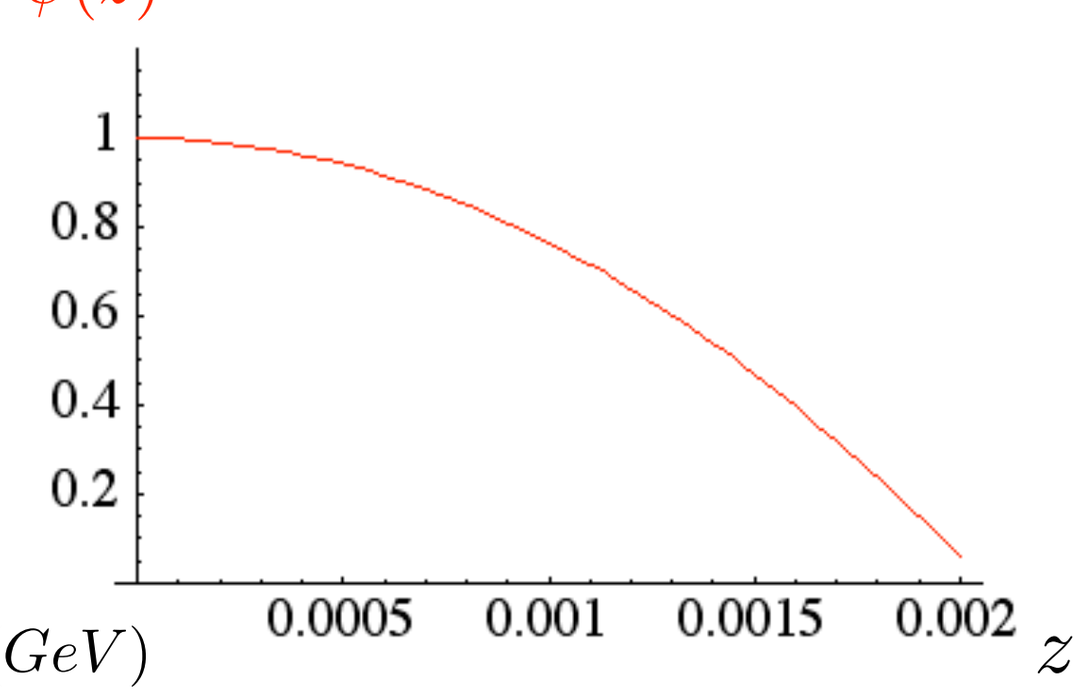
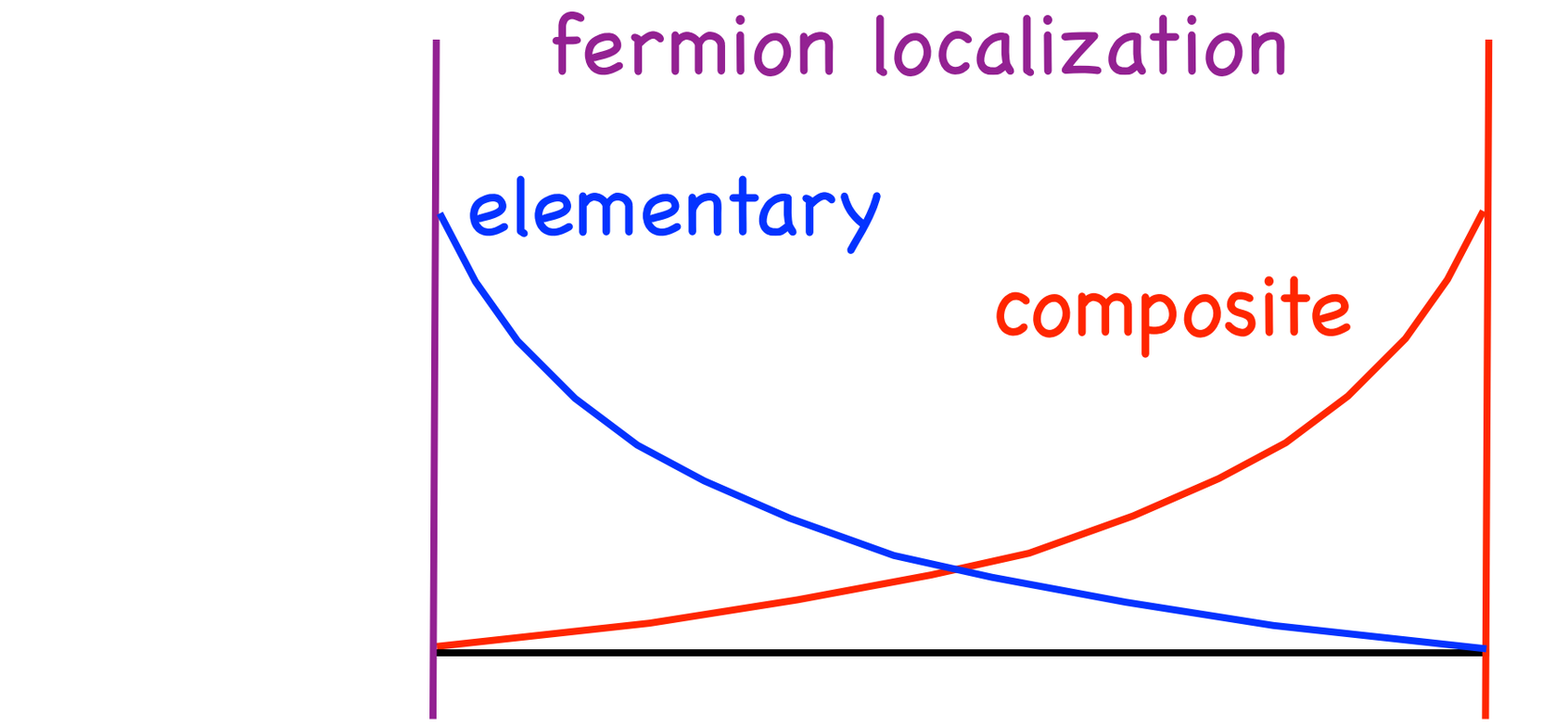




Higgs decouples as $v \to \infty$

M_W is insulated from divergences

Precision Electroweak



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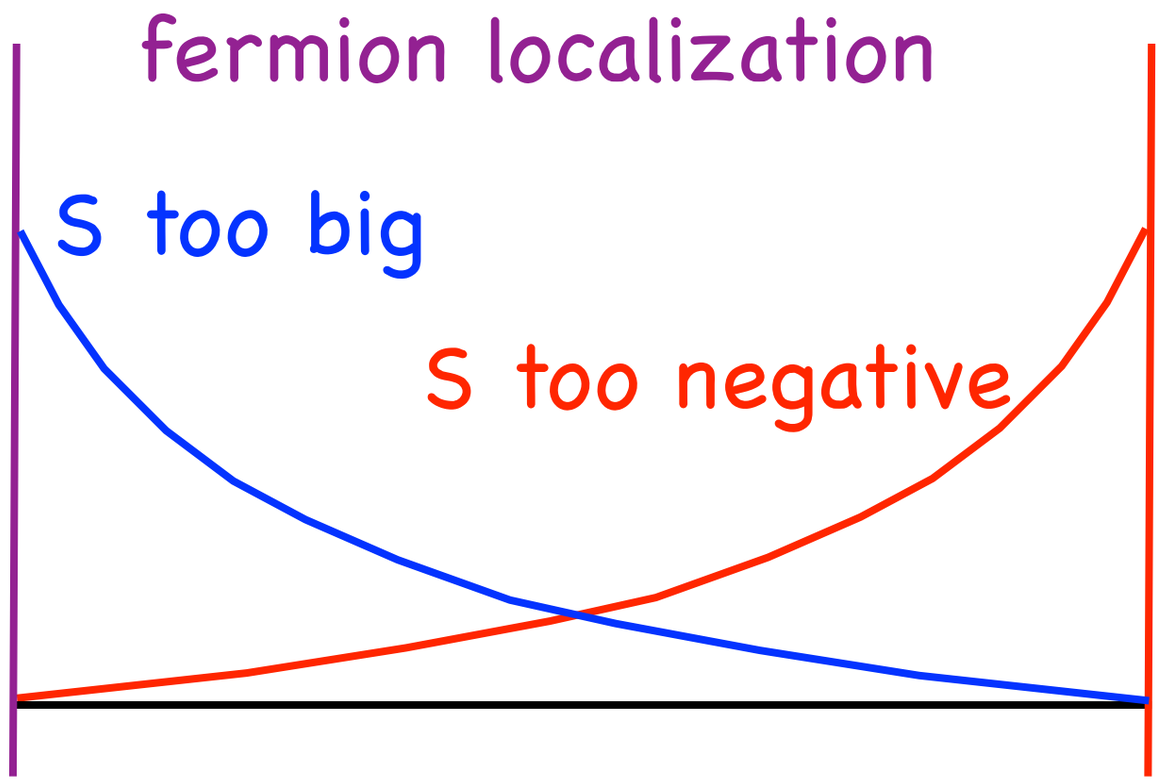

hep-ph/0308036 hep-ph/0203034

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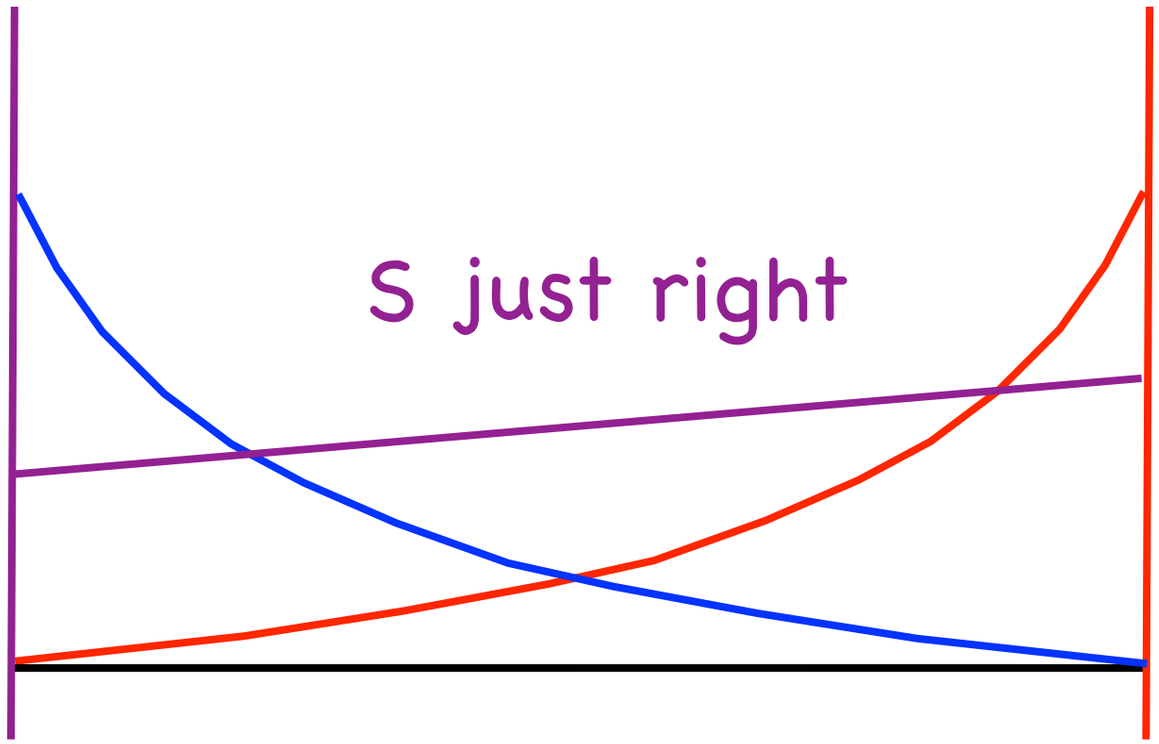
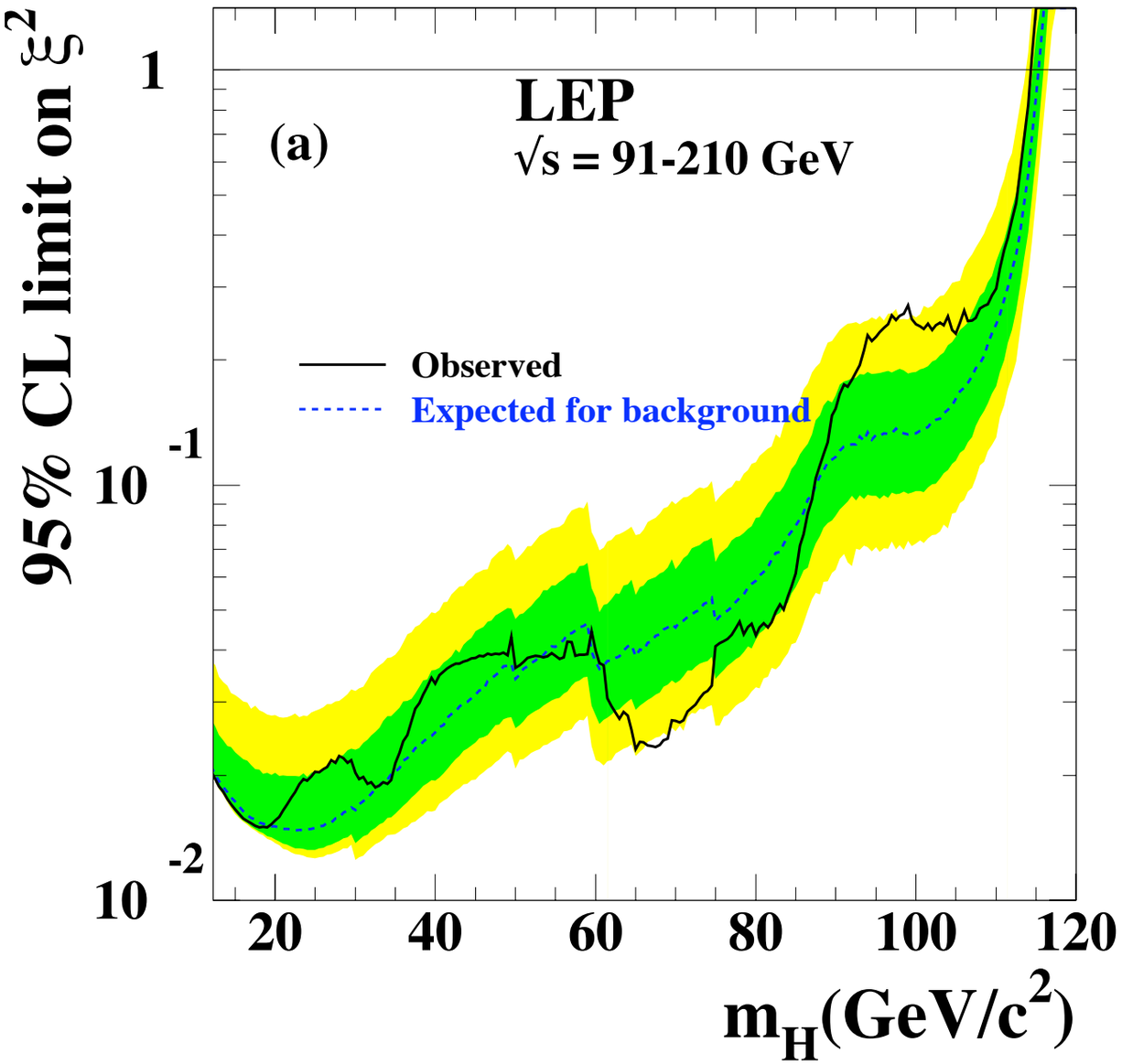


Cacciapaglia, Csaki, Grojean JT hep-ph/0409126

Missing the Higgs

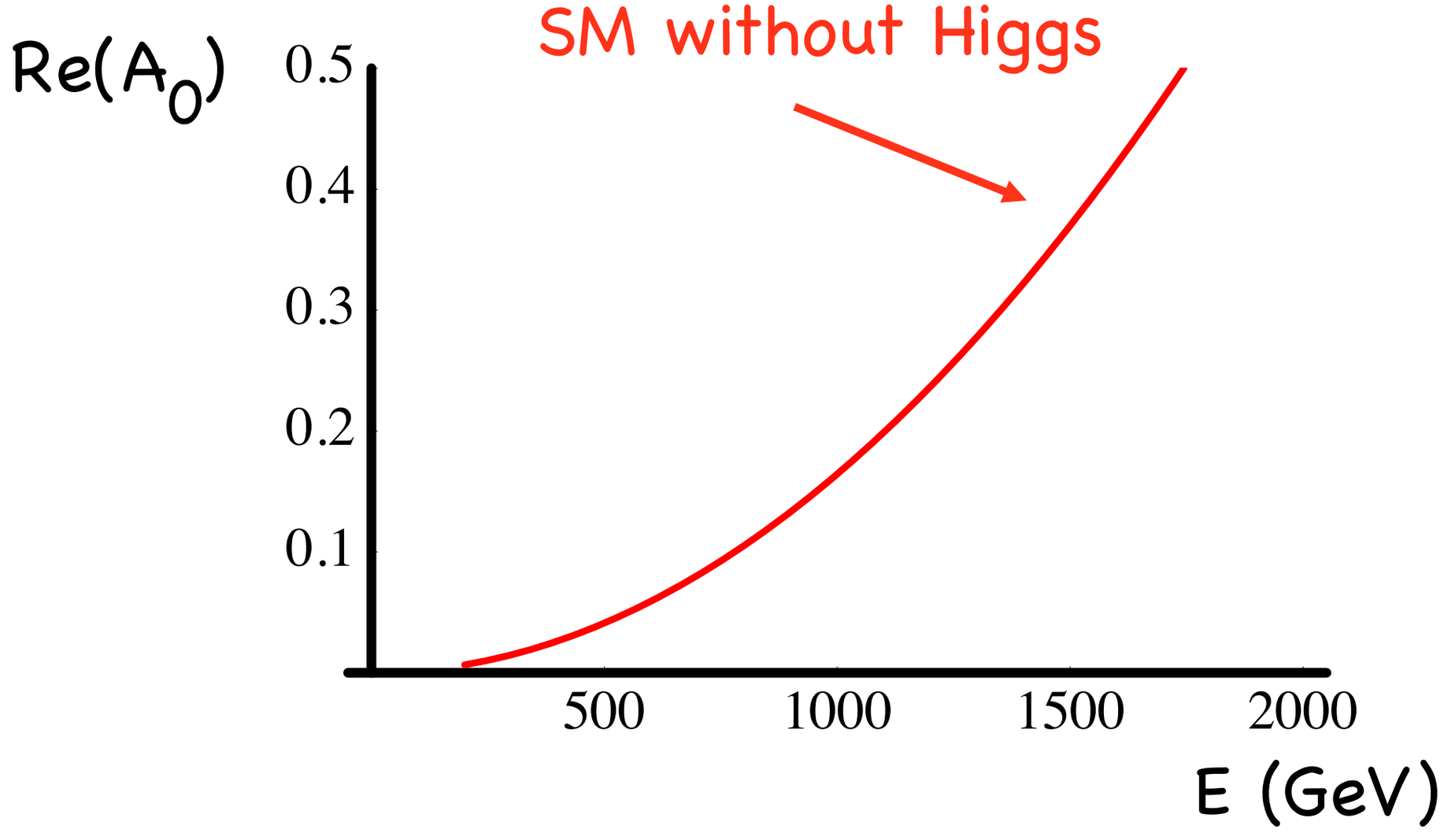
$$\xi^2 \equiv \frac{\sigma(e^+e^- \to HZ)}{\sigma_{SM}}$$

a light Gaugephobic/Unhiggs could have been missed at LEP



Why Build the LHC?

WW Scattering Amplitude



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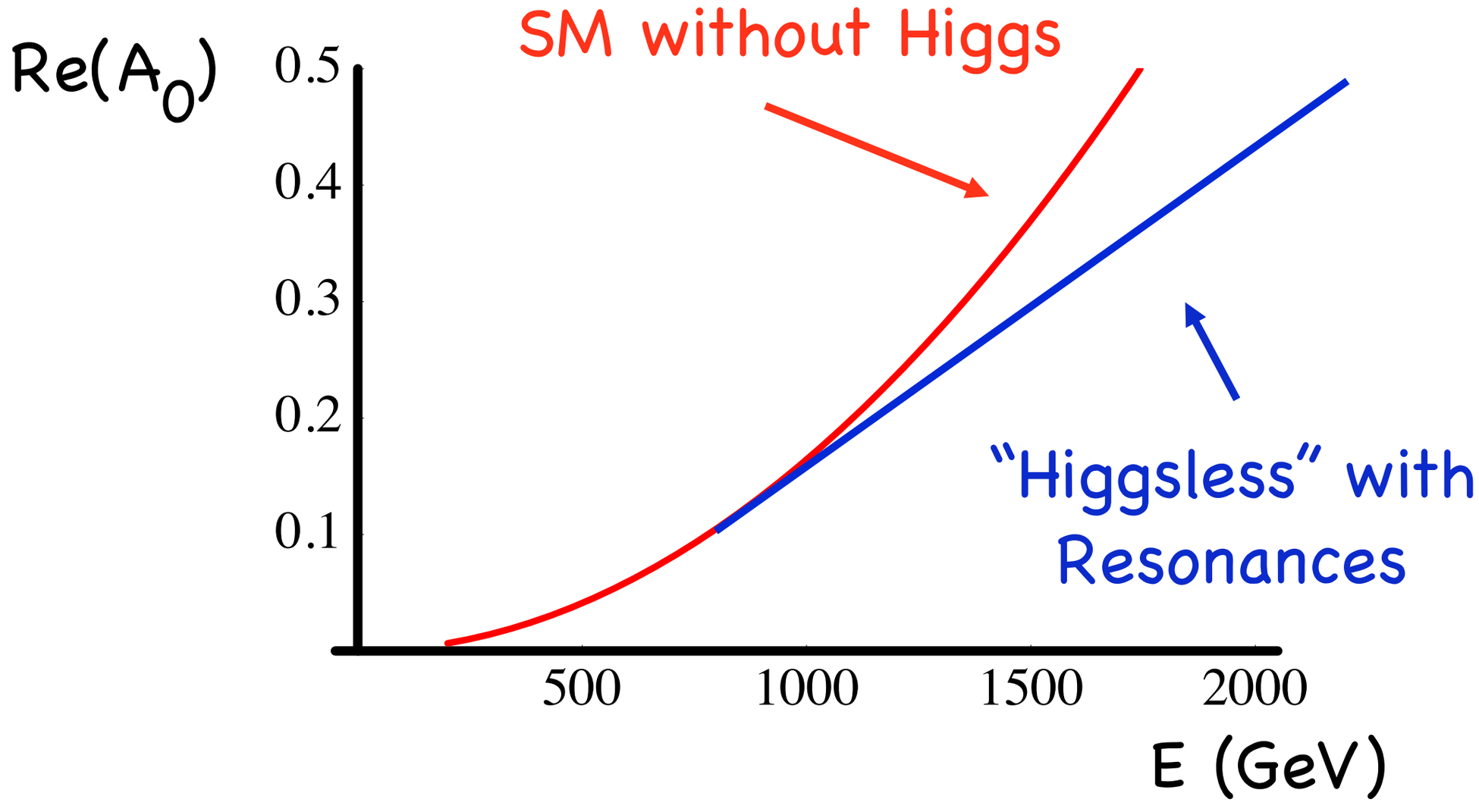
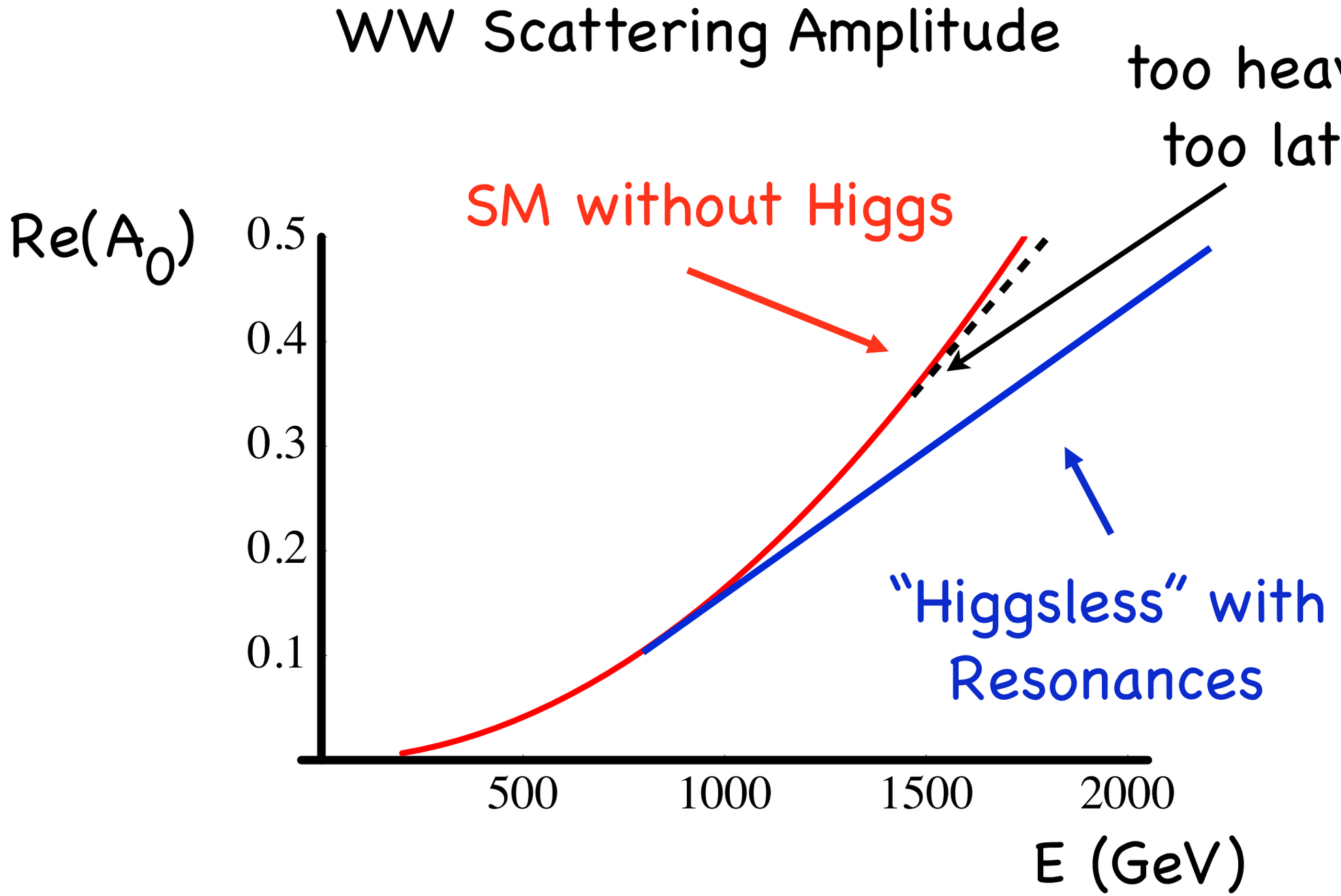
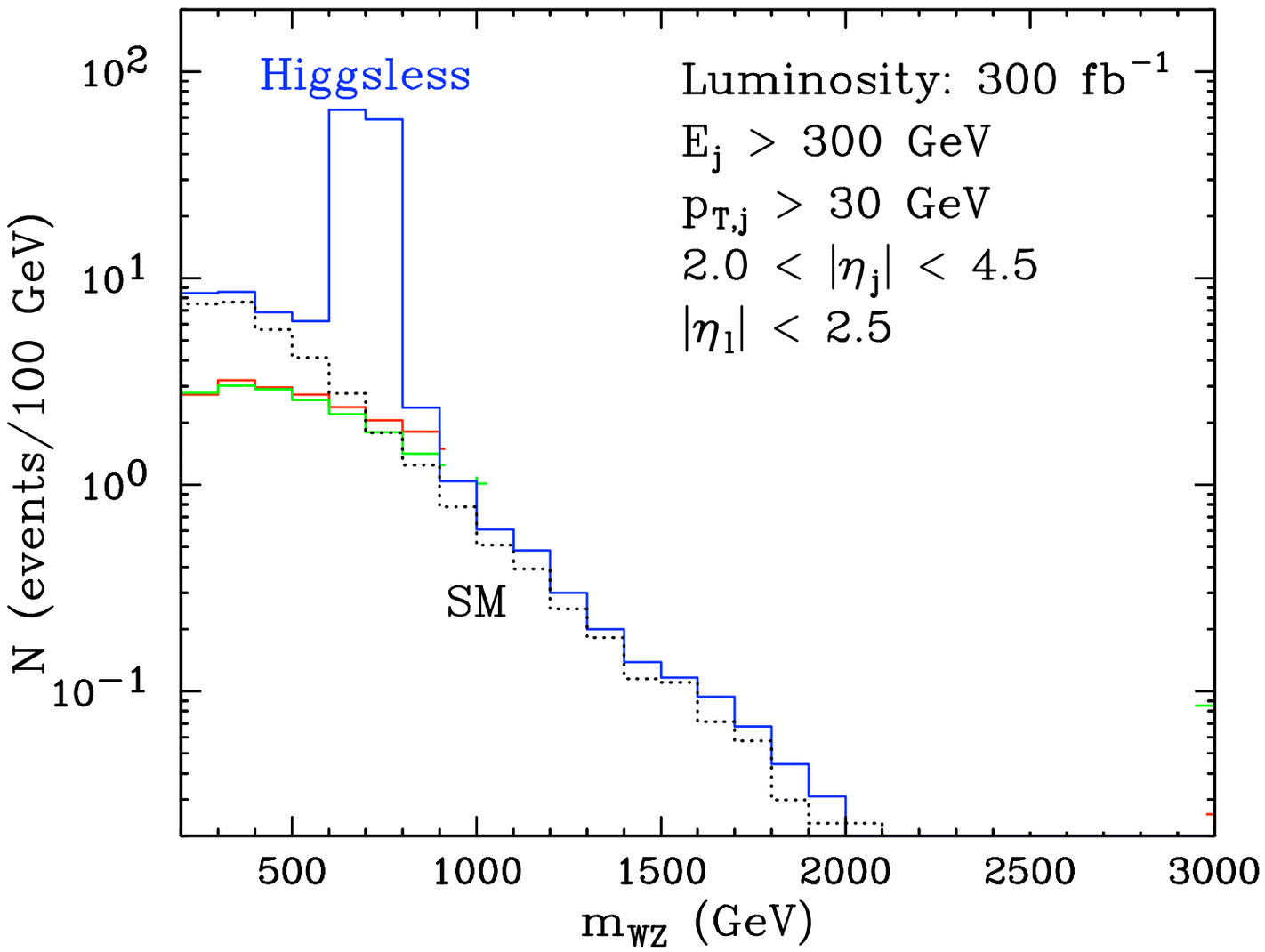


Why Build the LHC?

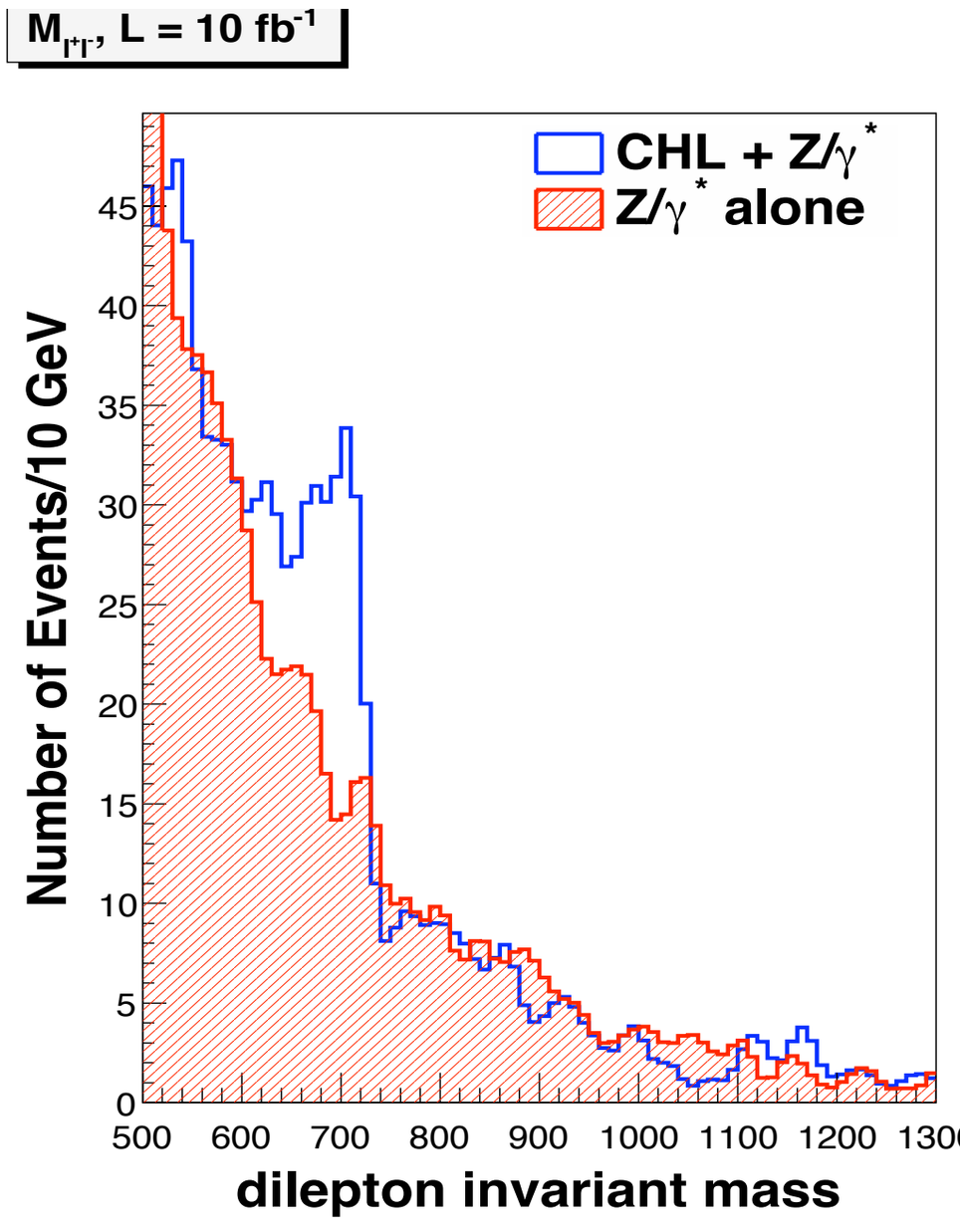


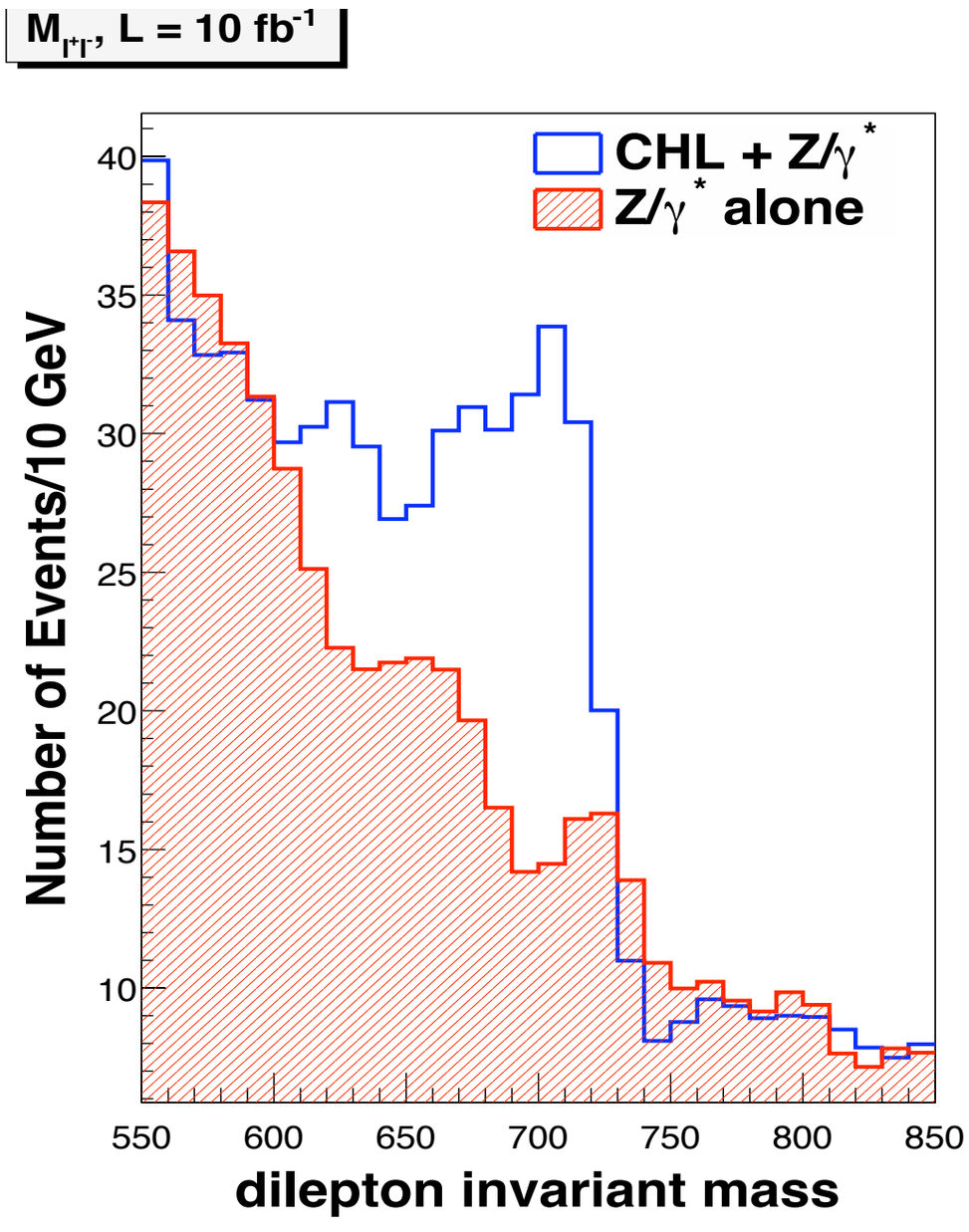
LHC Signal



Birkedal, Matchev, Perelstein hep-ph/0412278

Drell-Yan

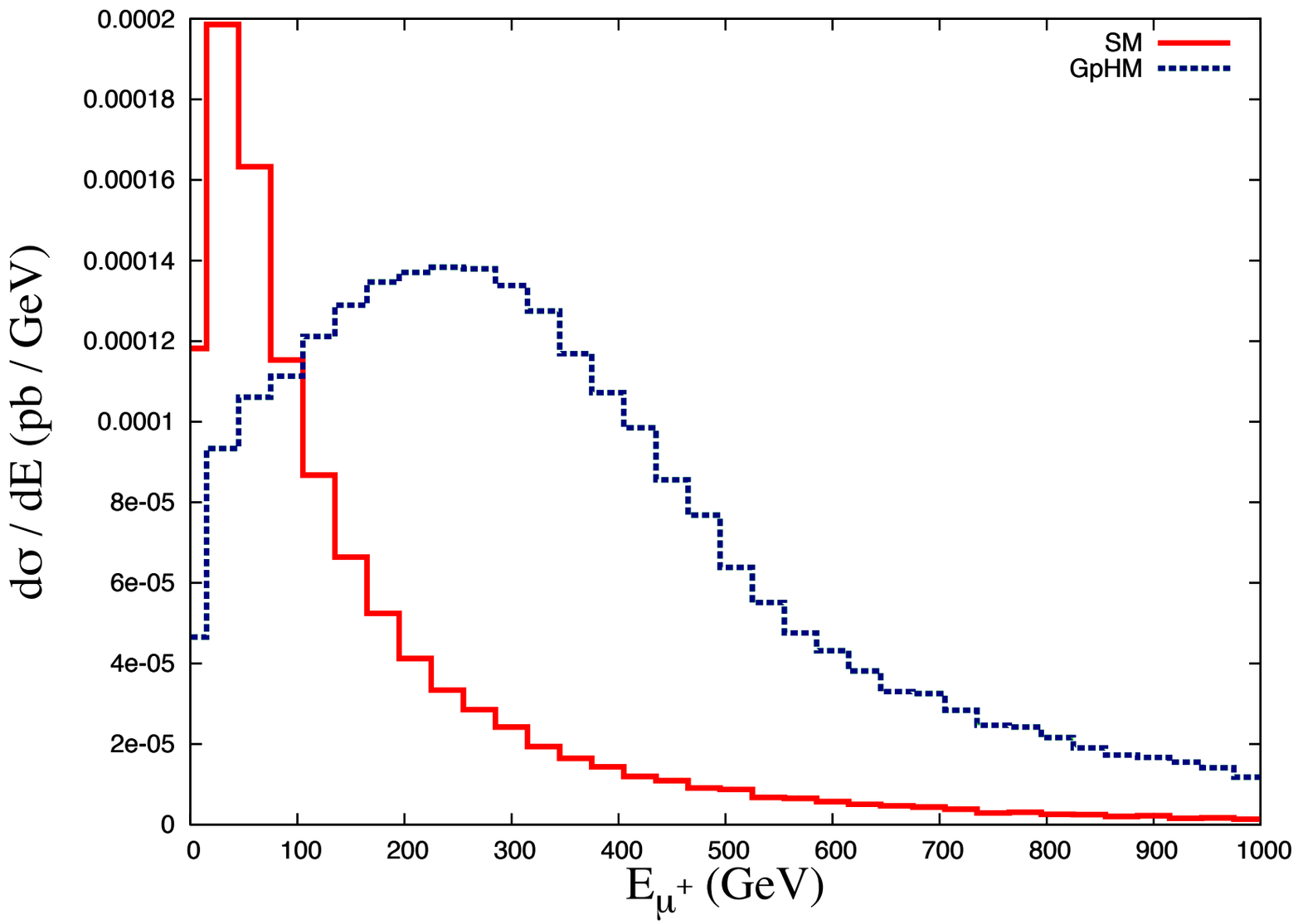




Sanz, Martin hep-ph/0907.3931

Gaugephobic Signal

$$pp \to W^{(2)} \to W^+ h \to \mu^+ \nu b \bar{b}$$

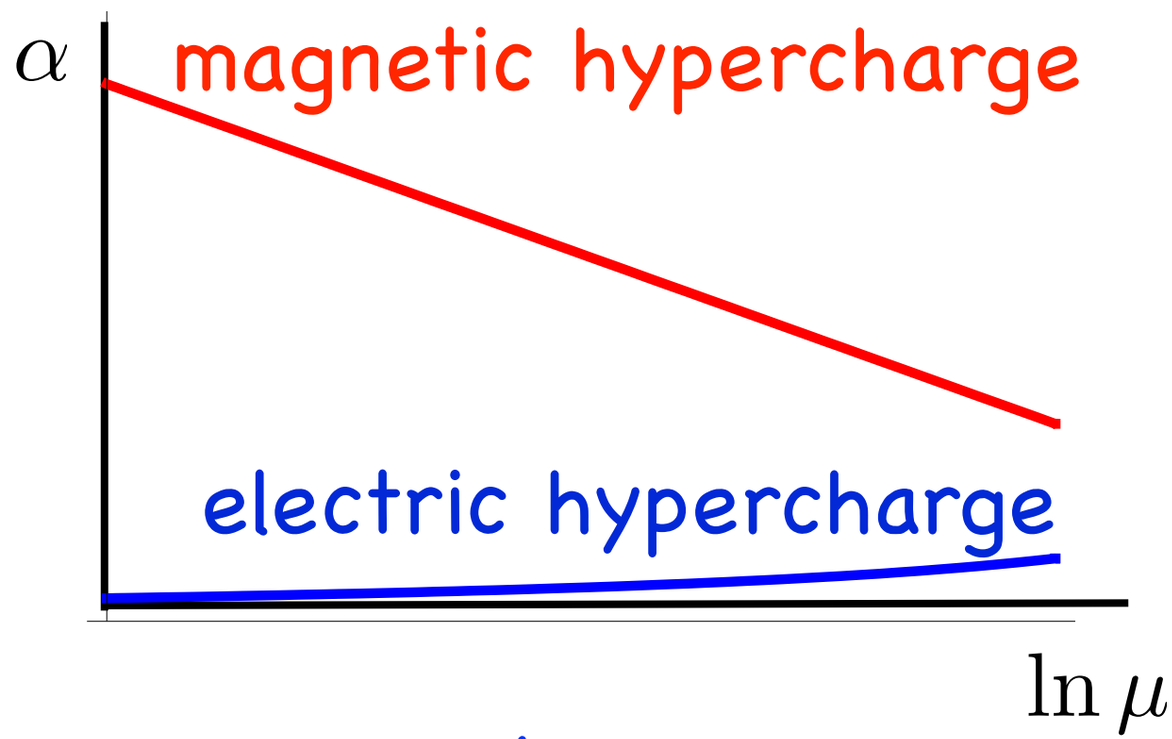


Galloway, McElrath, McRaven, JT hep-ph/0908.0532

Back to 4D

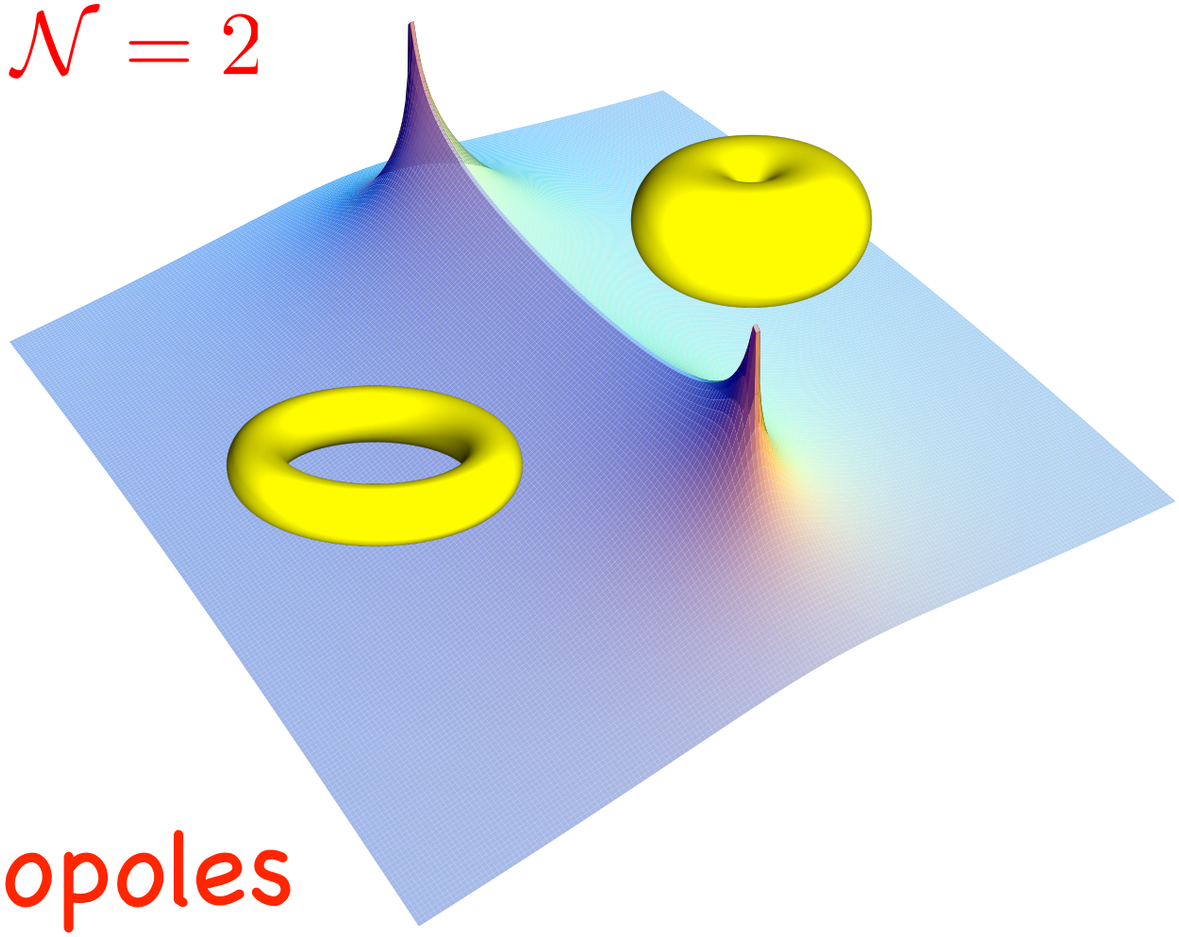
Magnetic Monopoles

a fourth generation with
magnetic charges?



Csaki, Shirman JT hep-ph/1003.0448, hep-ph/1003.????

Seiberg-Witten

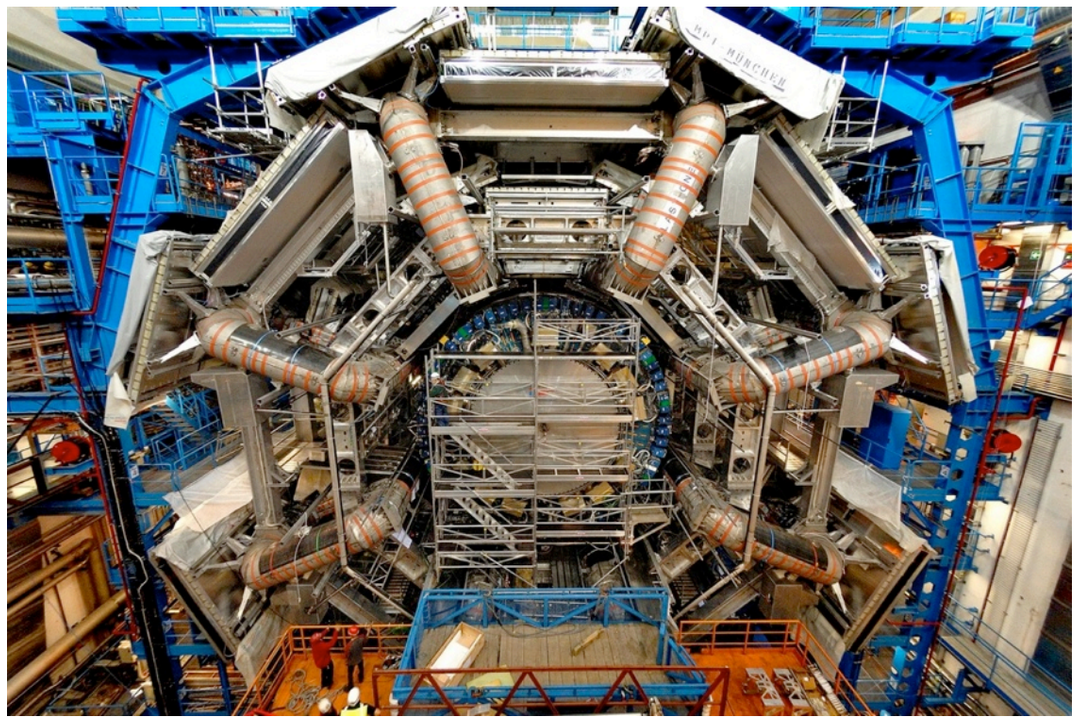


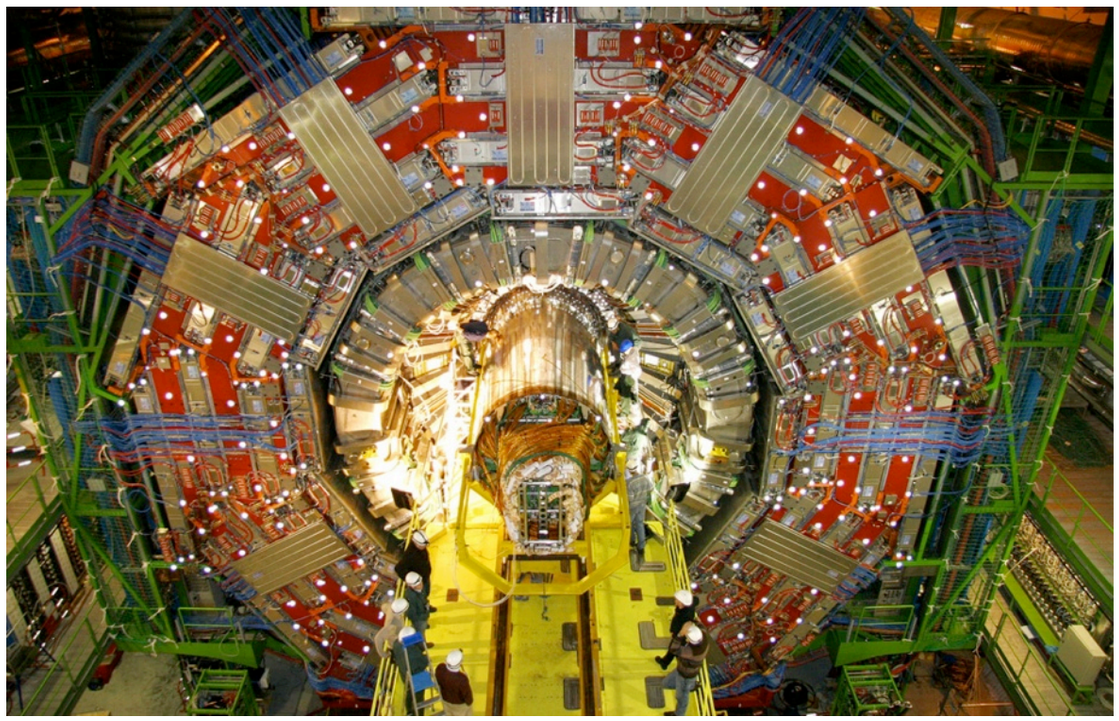
massless fermionic monopoles

hep-th/9407087

LHC

naively expect pair production,
unconfined, highly ionizing



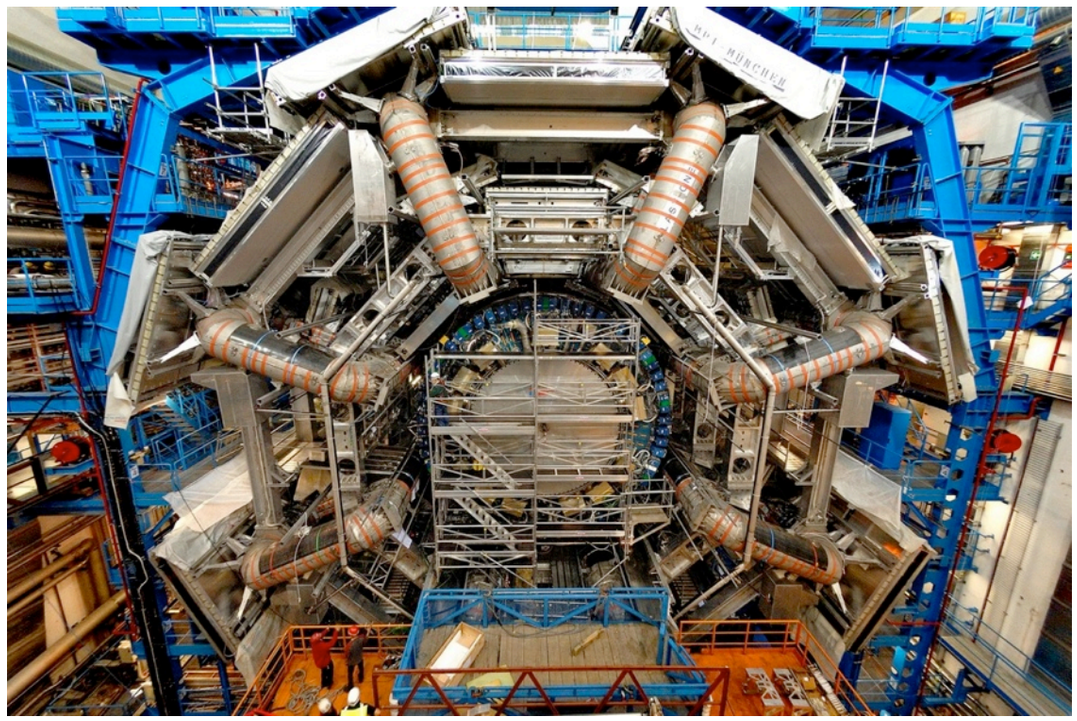


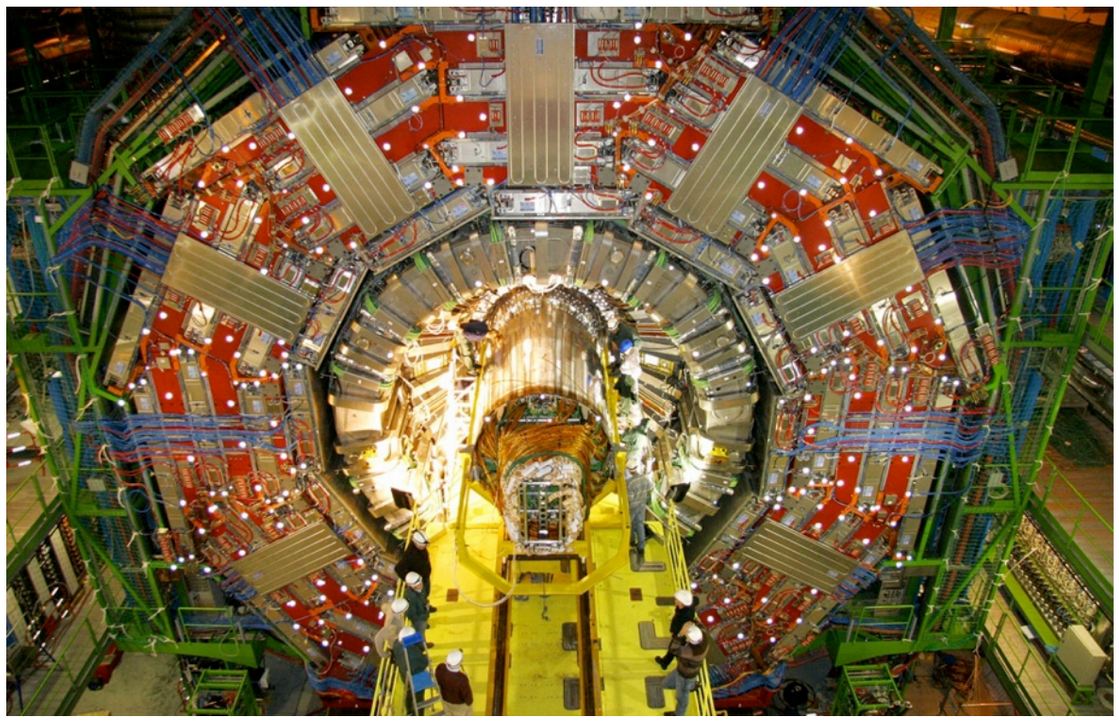
ATLAS has a trigger
for monopoles

CMS does not

LHC

naively expect pair production,
unconfined, highly ionizing



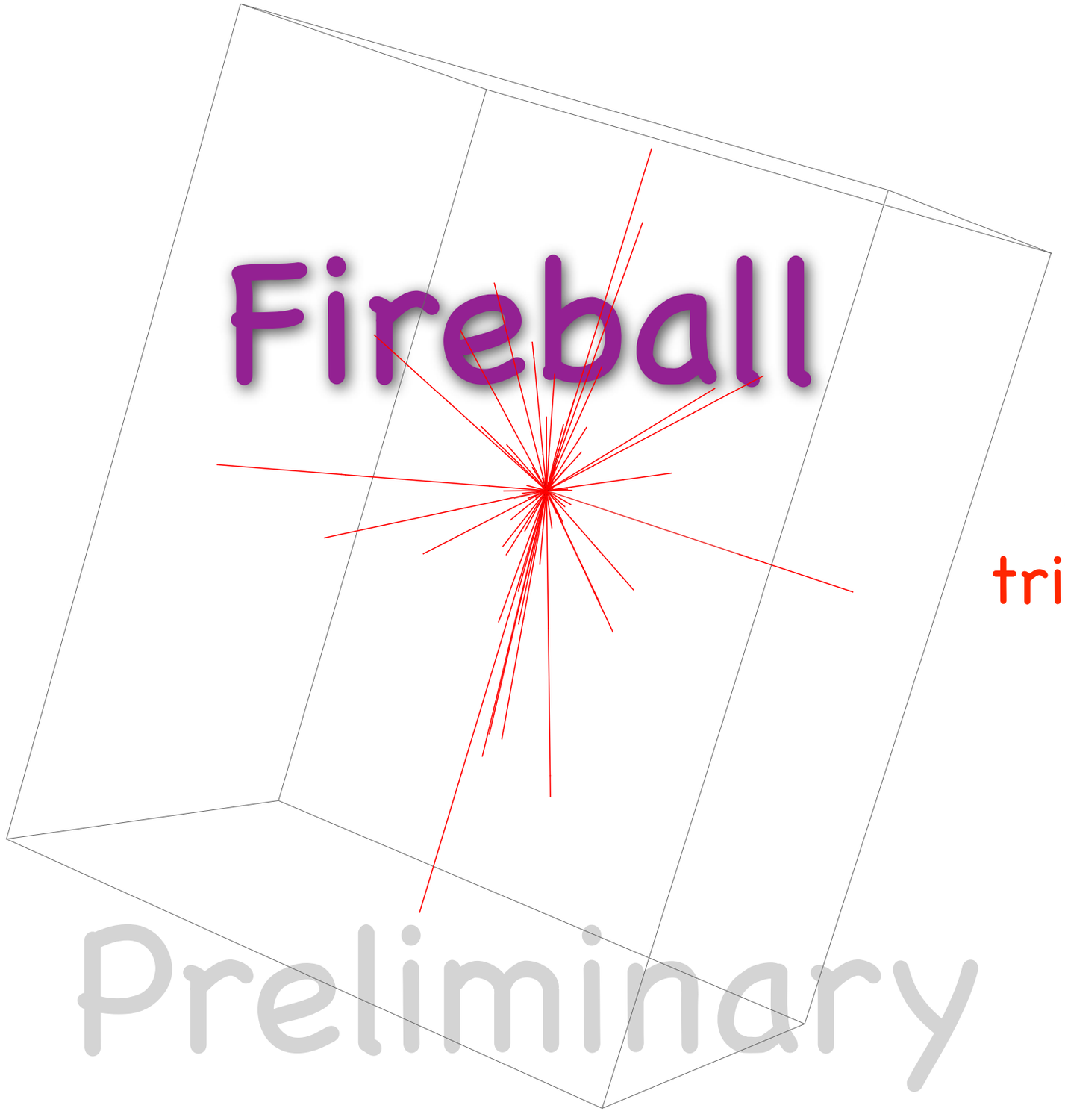


ATLAS has a trigger
for monopoles

but it won't work

CMS does not

Grojean, Weiler, JT



CMS has a trigger for this

Grojean, Weiler, JT

Conclusions

Even though the SM Higgs
search would fail,
Higgsless Models have
interesting LHC signatures

models with monopoles
have spectacular signatures