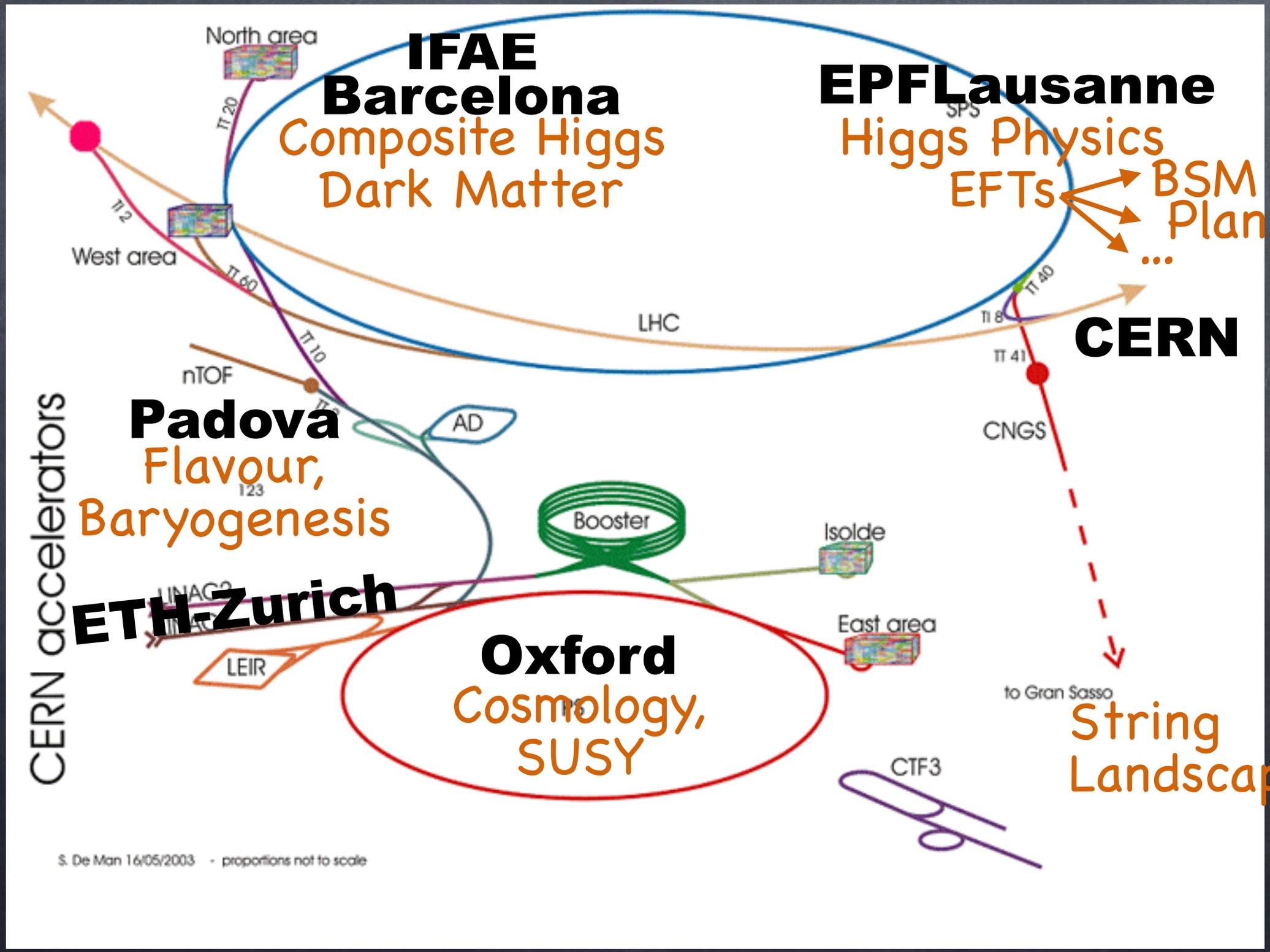
Francesco Riva



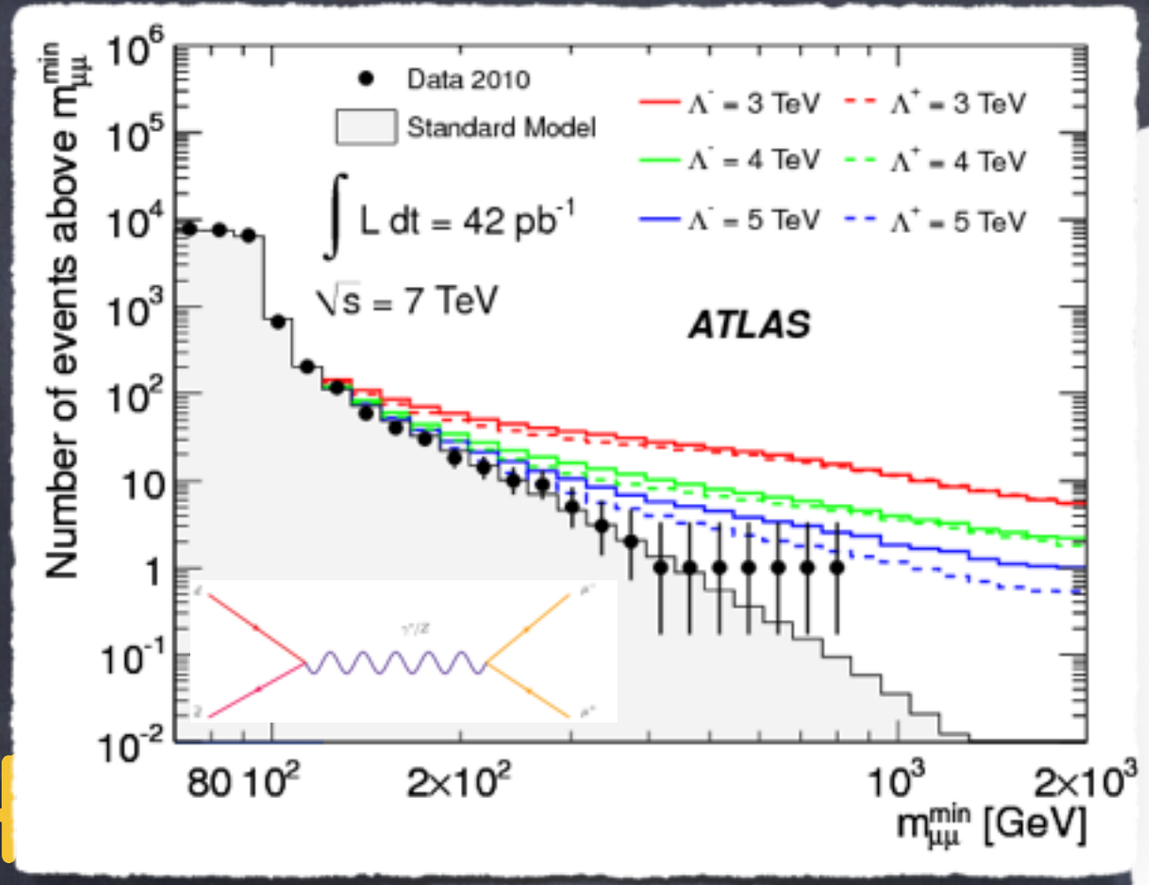
Francesco Riva

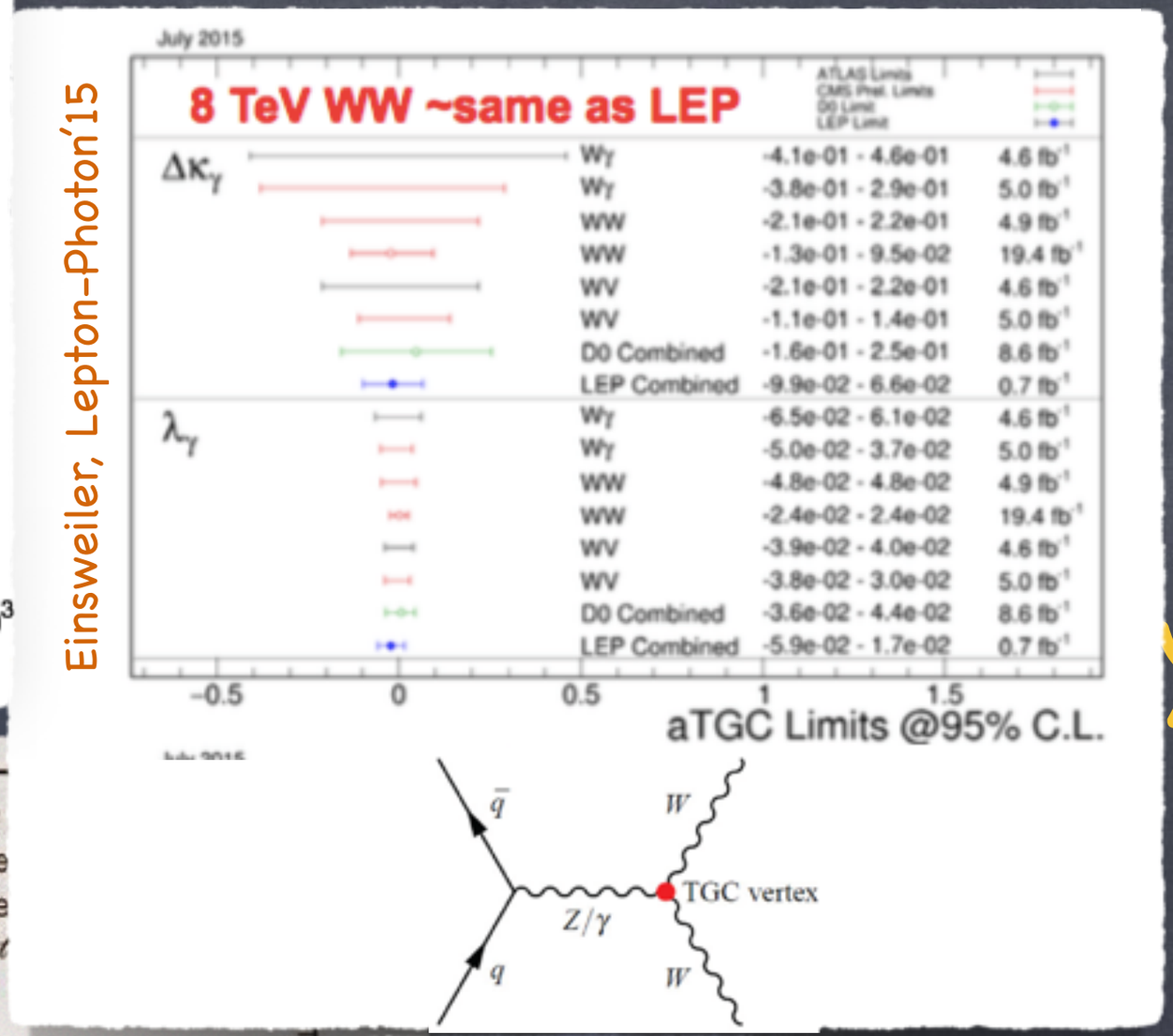
Precision Searches at High-Energy: What is being searched for?

Francesco Riva

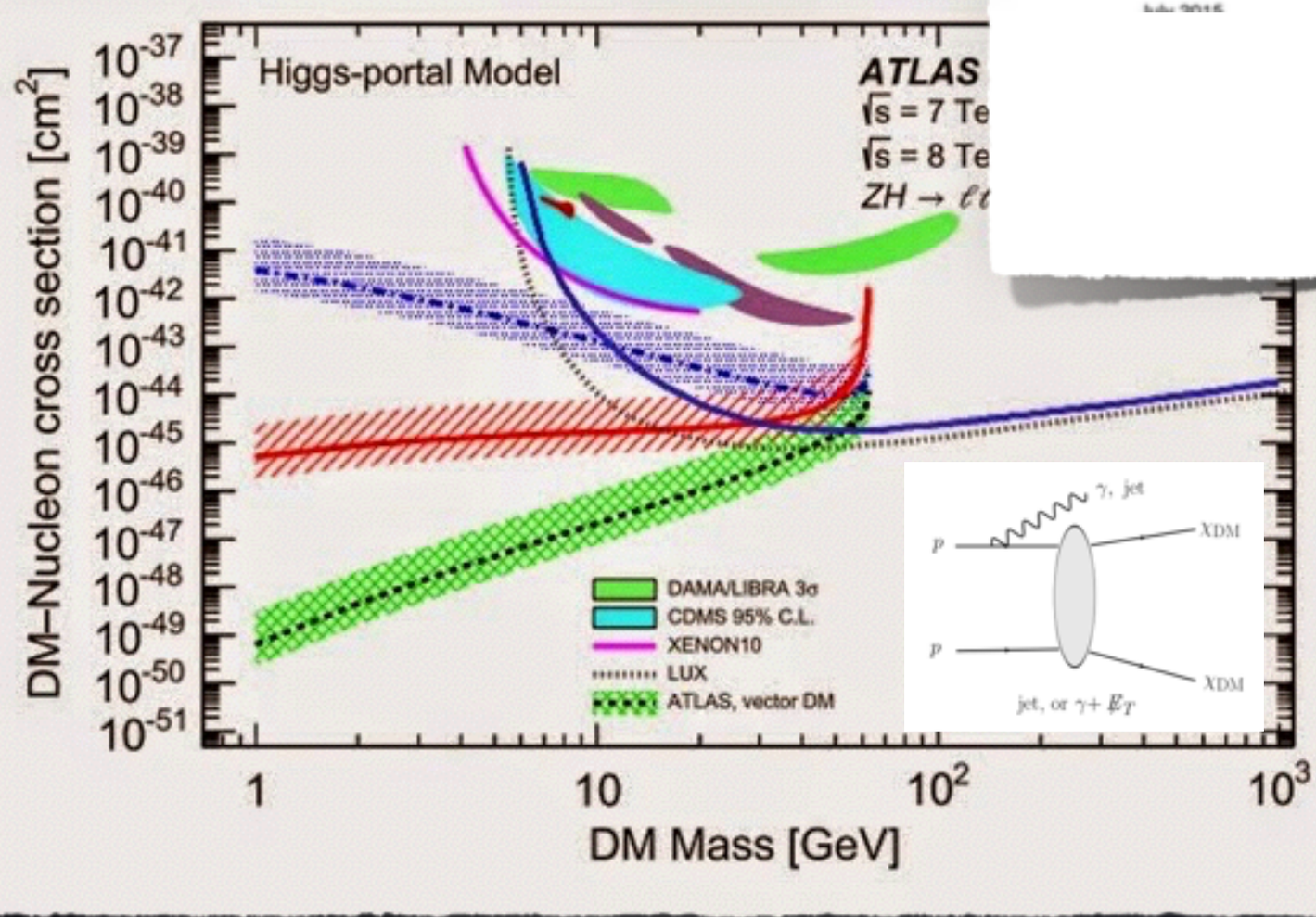
Precision Searches at High-Energy: What is being searched for?

Motivated/Structured by BSM EFT.
Compared to other searches through BSM EFT.





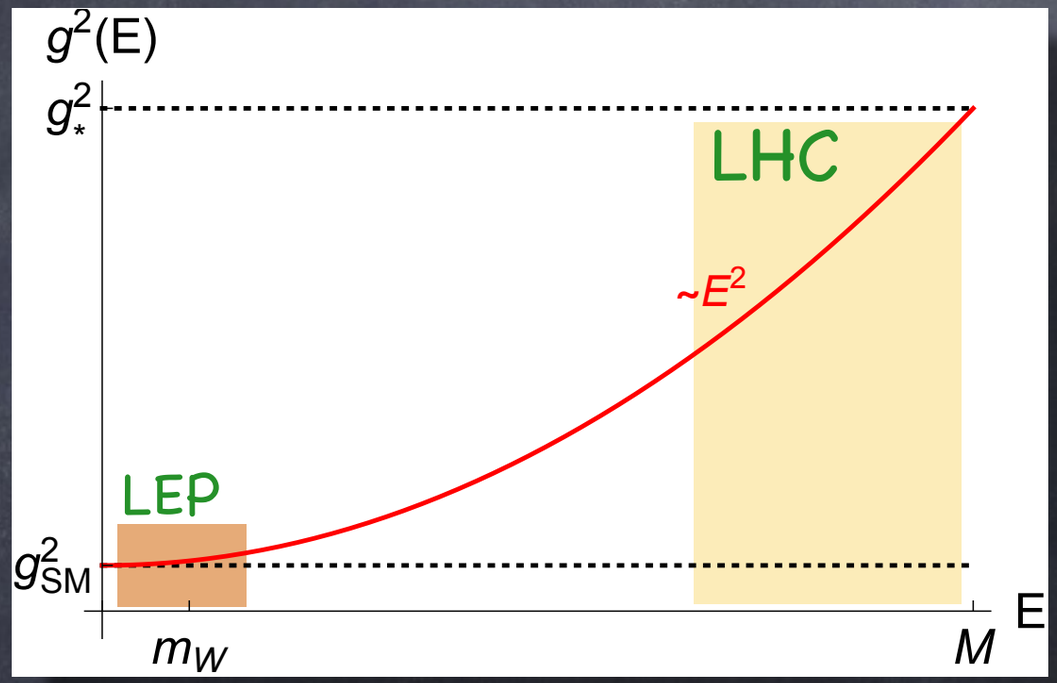
Einsweiler, Lepton-Photon'15



Small sensitivity
High Energy

LHC ~~better~~ different than LEP?

High sensitivity
Smaller Energy



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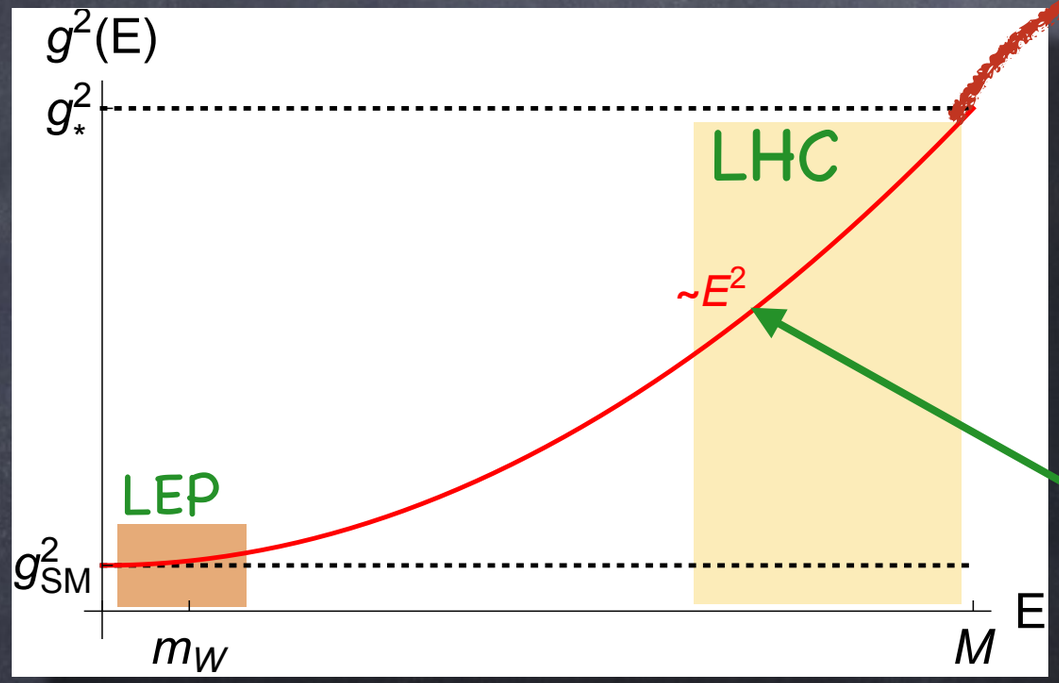

EFT: motivates this in terms of this

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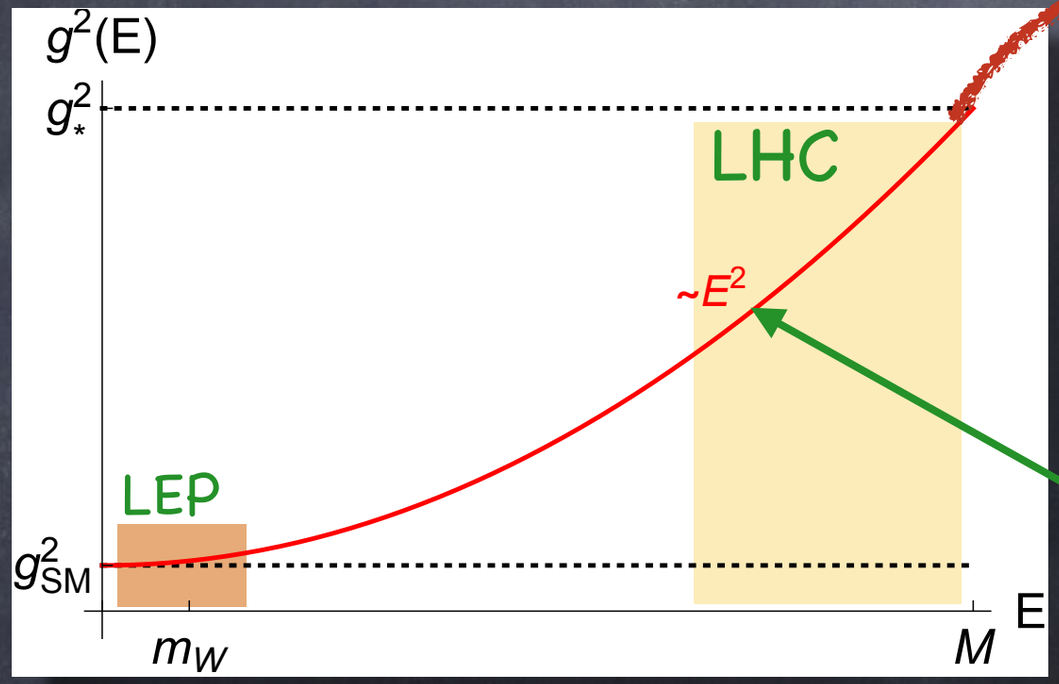

EFT: motivates this in terms of this

$$\mathcal{A} = g^2(E) = g_{SM}^2 \left(1 + \frac{g_*^2}{g_{SM}^2}\frac{E^2}{M^2}\right)$$

$M =$ BSM scale
$g_* =$ BSM coupling

- Small Sensitivity at High energy requires strong coupling

Strong Coupling at High-Energy

- Higgs as a (pseudo) Goldstone boson: $H \to H + c$ $g_* D_\mu H$ ✓ ϵH ✗

Liu,Pomarol,Rattazzi,FR 'to appear

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  - $\frac{g_*^2}{M^2}(H^\dagger D_\mu H)^2$ big
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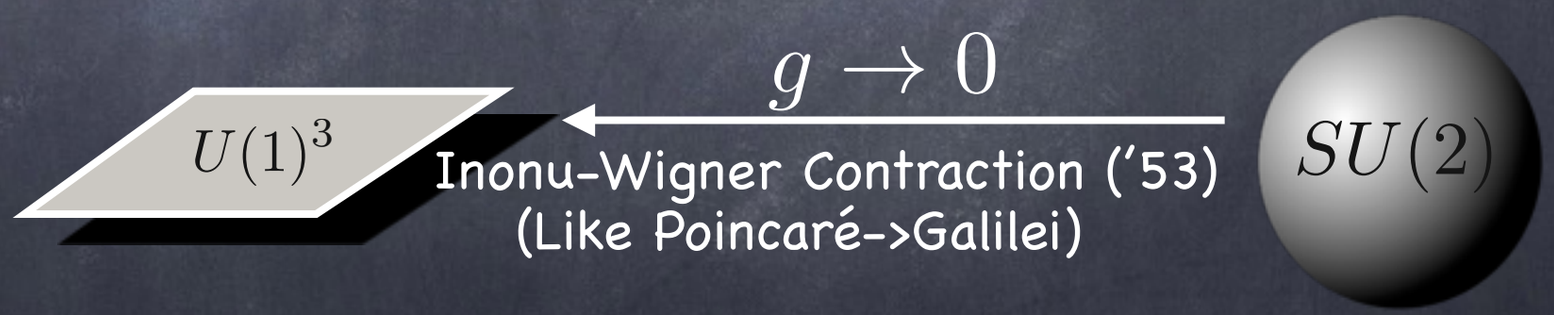
Structurally consistent:



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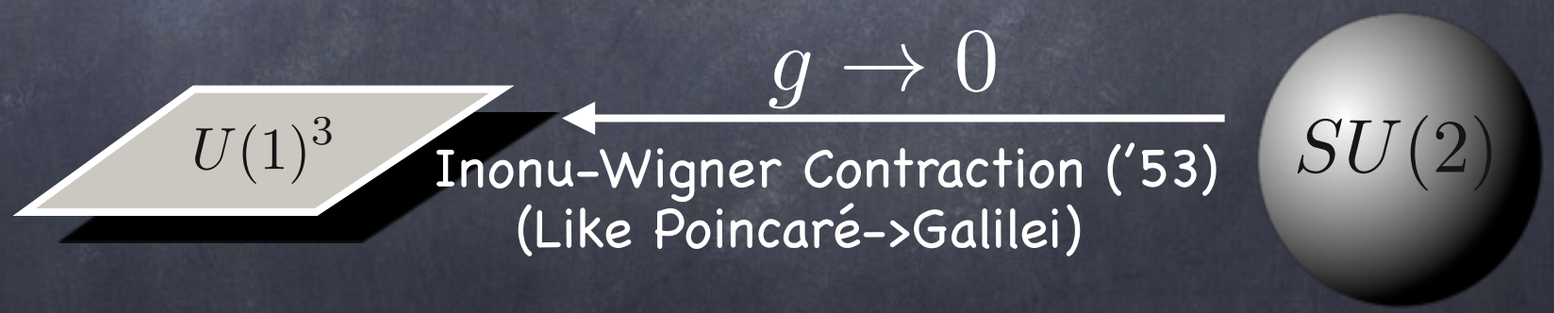


- Only irrelevant interactions are strong!
- Large effects at high-E: $\frac{g_*}{M^2}\epsilon_{abc} W_\mu^{a\,\nu} W_{\nu\rho}^b W^{c\,\rho\mu} \to$

$\sim g g_* \frac{E^2}{M^2}$

Liu,Pomarol,Rattazzi,FR 'to appear

Strong Coupling at High-Energy

- Higgs as a (pseudo) Goldstone bo

$H \to H + c$ $\quad g_* D_\mu H$ ✓ $\quad \epsilon H$ ✗

$\ldots)^2$ small

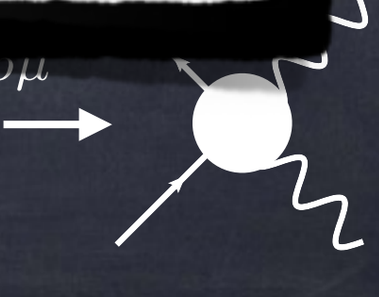
- Dipole-strong gauge bosons

Struc
con

$= \partial_\mu + igW_\mu$

$\ldots$ ('53) $\quad SU(2)$

- Only irreleva
- Large effects at high-E: $\frac{g_* \epsilon_{abc} W^{a\,\nu}_{\mu} W^{b}_{\nu\rho} W^{c\,\rho\mu}}{M^2}$



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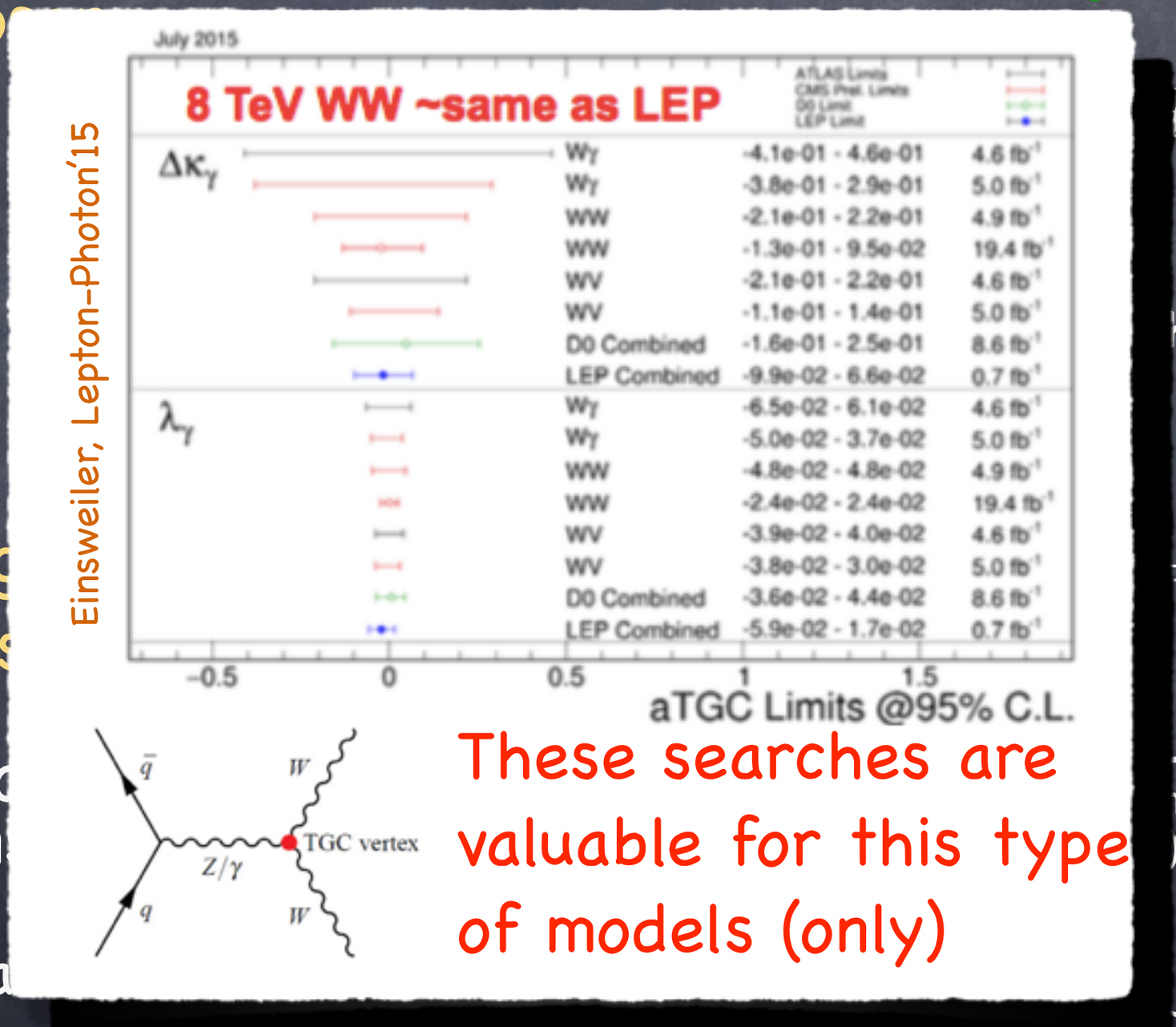

These searches are valuable for this type of models (only)

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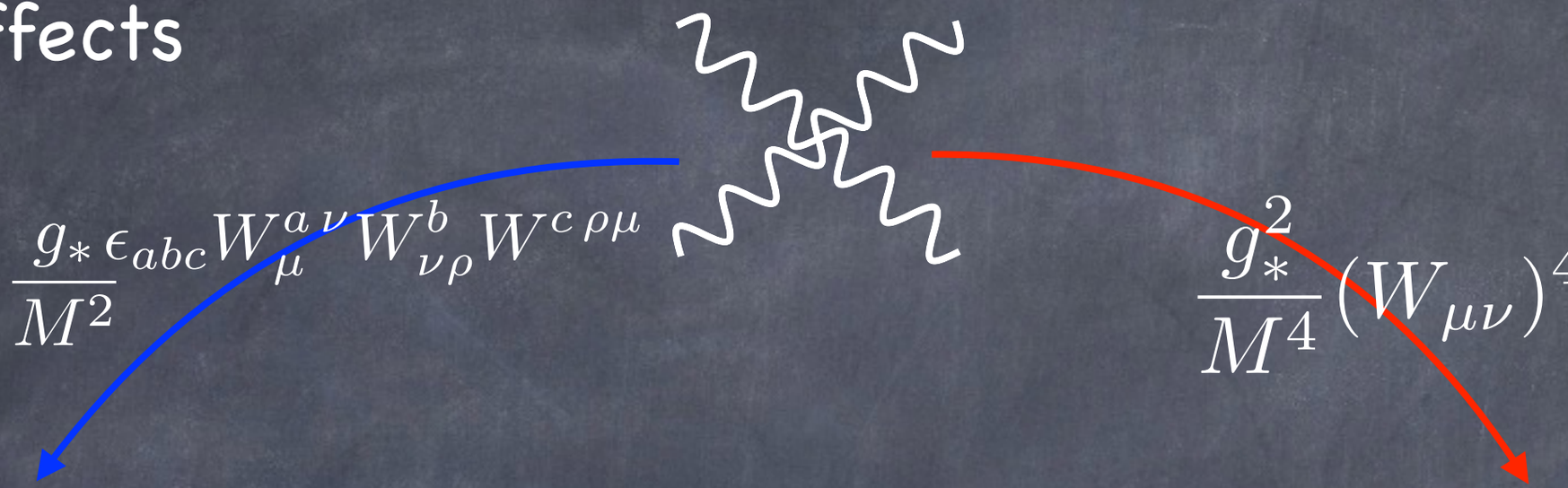
Strong Coupling for Vectors?

Side effects



- In the cross-section, for $E^2/M^2 > g/g_*$:

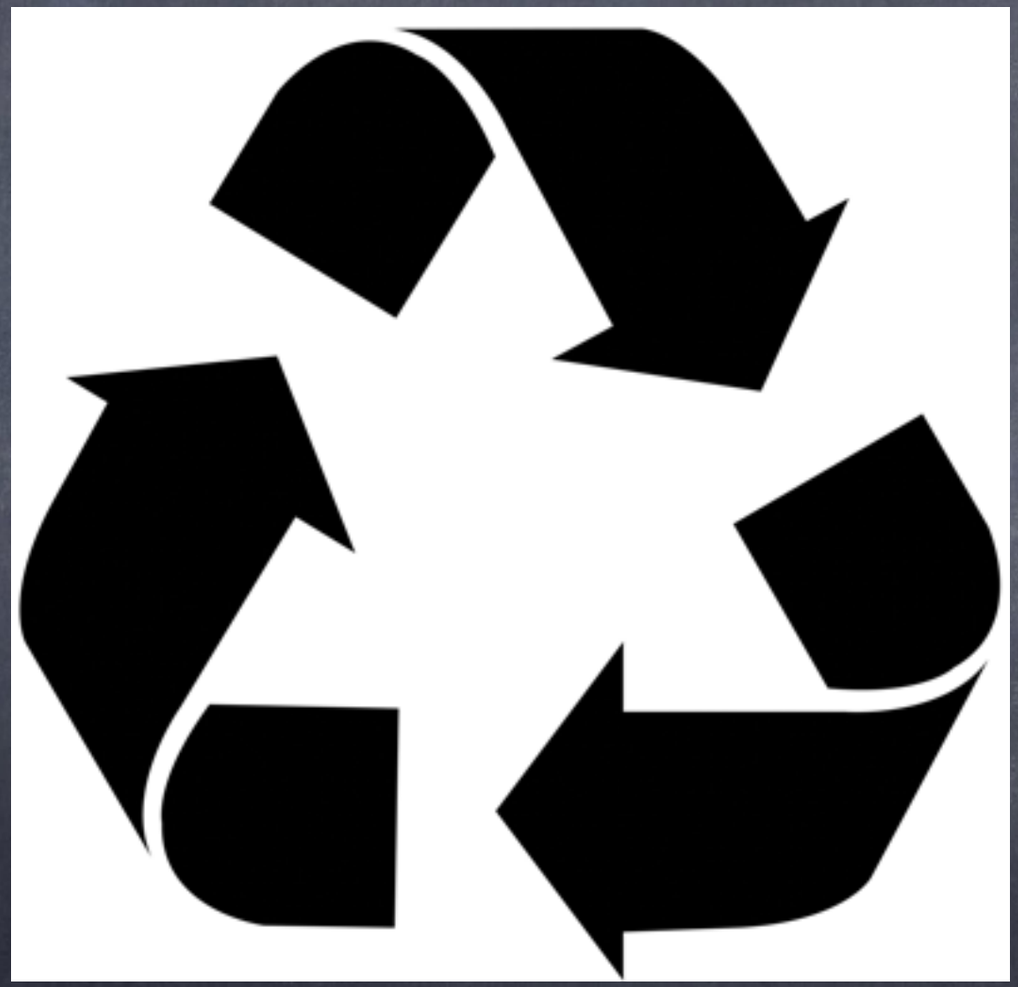
  SM^2<<dim-6 x SM << dim-6^2 = dim-8 x SM << dim-8^2 dominate

  (but EFT expansion ok: after that, series converges...)

Liu,Pomarol,Rattazzi,FR 'to appear
Azatov,Contino,Machado,FR to appear

Conclusions

Precision tests at the LHC



BSM perspective

EFT motivation/structure

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