



What do we want to order?

BSM models

Parametrization

Experiments

Selectivity

(S,T)

\cap

EFT - dim-6

(expansion in fields and derivatives)

$$H^\dagger D^\mu H \bar{f} \gamma_\mu f$$

SILH expansion
(scale AND coupling)

Kappas

(expansion in derivatives?)

$$Z^\mu \bar{f} \gamma_\mu f$$

$$W^\mu \bar{f} \gamma_\mu f'$$

+ ...

Form Factors F(q)
(even more general)

Simplicity

Parameters

Complexity

Precision

Imprecision

Generality

LEP



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Experiments

Universal Theories
(Z', Technirho, Composite Higgs,...)

Selectivity

(S, T)

Simplicity

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Non-universal Theories
(Partially Composite fermions,...)

EFT - dim-6

(expansion in fields and derivatives)

$$H^\dagger D^\mu H \bar{f} \gamma_\mu f$$

Strongly Coupled
(Minimal Composite Higgs,...)

Weakly Coupled
(SUSY,...)

SILH expansion
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LEP

Parameters

Th. with Non-linearly realized EWSB
(Technicolor)

Kappas

(expansion in derivatives?)

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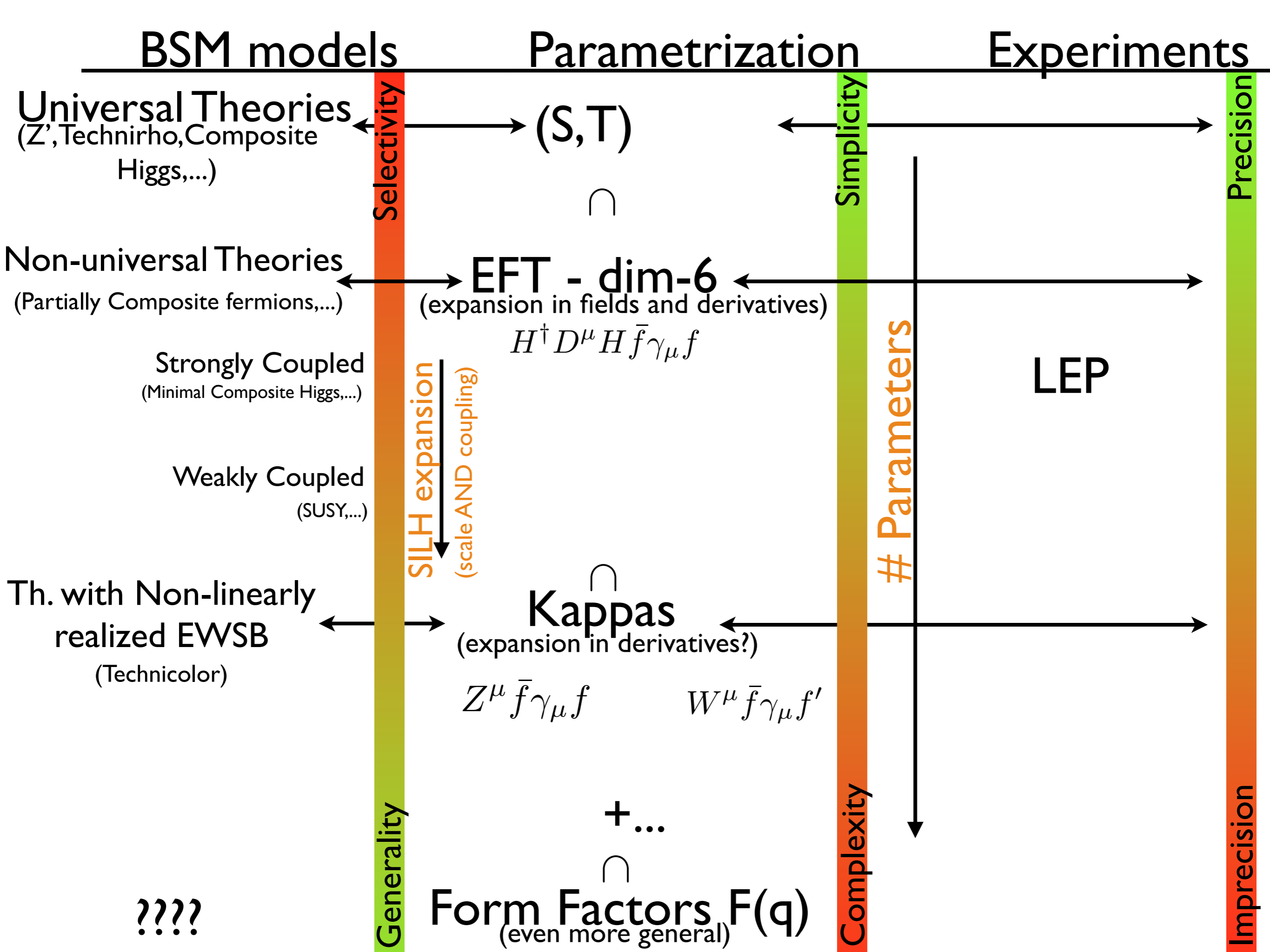
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BSM models

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$$(S, T) + (k_v, k_f)$$

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EFT - dim-6

(expansion in fields and derivatives)

$$H^\dagger D^\mu H \bar{f} \gamma_\mu f + |H|^2 |D_\mu H|^2 + \dots$$

Strongly Coupled
(Minimal Composite Higgs,...)

Weakly Coupled
(SUSY,...)

SILH expansion
(scale AND coupling)

Parameters

LEP
LHC
RUN I

Th. with Non-linearly realized EWSB
(Technicolor)

Kappas

(expansion in derivatives?)

$$(h) Z^\mu \bar{f} \gamma_\mu f \quad (h) W^\mu \bar{f} \gamma_\mu f'$$

$$h Z_\mu Z^\mu \quad h W_\mu W^\mu$$

+ ...

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EFT - dim-6

(expansion in fields and derivatives)

Strongly Coupled
(Minimal Composite Higgs,...)

$$H^\dagger D^\mu H \bar{f} \gamma_\mu f + |H|^2 |D_\mu H|^2 + \dots$$

Weakly Coupled
(SUSY,...)

$$|H|^2 W_{\mu\nu} W^{\mu\nu}$$

SILH expansion
(scale AND coupling)

Parameters

LEP
LHC_{RUN1}
LHC_{RUN2}

Th. with Non-linearly realized EWSB
(Technicolor)

Kappas

(expansion in derivatives?)

$$(h) Z^\mu \bar{f} \gamma_\mu f \quad (h) W^\mu \bar{f} \gamma_\mu f'$$

$$h Z_\mu Z^\mu \quad h W_\mu W^\mu$$

$$h W_{\mu\nu} W^{\mu\nu} \quad h Z_{\mu\nu} Z^{\mu\nu} + \dots$$

Generality

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Form Factors F(q)
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Validity?

I) RUNI: Measurement of hbb coupling (0,2.5) what did we learn?

c's - no information for theories with light H doublet

(expansion parameter EFT $c_b \frac{v^2}{f^2} \gtrsim 1$)

k's - important for theories with NL EWSB (no field expansion)

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2) RUN2: Measurement of $V^* \rightarrow Vh$ (or $h^* \rightarrow ZZ$) sensitive to high energy

- still a valid description? (due to E/M expansion)

- can info on “energy of highest sensitivity“ be provided?



$$hV^\mu V_\mu$$

$$hV_\mu \bar{f} \gamma^\mu f$$

$$hV^{\mu\nu} V_{\mu\nu}$$

SM rescaling
like 1)

Grows fast with E
In some BSM valid at $E > M$

Grows with E
Generally not valid at $E > M$

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3) RUN2: Measurement of $h \rightarrow Vff$ sensitive to small energy

- not capturable by neither **c's** nor **k's**

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- not capturable by neither **c's** nor **k's**

➔ k's no longer “easy” nor complete
➔ difference with c's: no relation with EWSB observables!