Theory Motivation for MET

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Why $E_t$?

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it's the signal for SUSY

but there are more general reasons!
Dark Matter

Fact: a stable, neutral particle with mass $\approx M_{\text{weak}}$ has correct thermal abundance to be DM.

Assume: no accident, e.g. DM = WIMP

naturalness: Couples to Standard Model

$\Rightarrow$ produced at LHC

$\Rightarrow$ $\tilde{\nu}_t$
Corroboration?

PAMELA

... DM decays into $e^+e^-$? ...
Higgs Naturalness

**quadratic divergences in \( M_{Higgs} \)**

Canceled by loops of New Physics

\[ \rightarrow M_{N.P.} \lesssim 1 \text{ TeV} \]

**Precision Measurements:**

\[ \rightarrow M_{N.P.} \gtrsim 5 \text{ TeV} \]

conflict!
New Physics Parity

$\text{SM} : \text{even}$

$\text{NP} : \text{odd}$

[Diagrams of allowed and forbidden processes]
New Physics Parity

lightest NP particle ($LNP$) stable

$\Rightarrow$ identify with DM

cascade decays $E_T$
$E_t$ well-motivated

Example models:

- SUSY
- Little Higgs w. T parity
- UED
- LED
  
  :
value of models

- concrete
- might be correct
- parametrization of signature space

trouble with models

- hidden model arbitrariness
- all known models are fine-tuned
- incomplete param. of sig. space

»model-independent analyses «
$E_t$ signature space

- SUSY
- LHT
- TWIN HIGGS
- SUSY
- LHT
- SUSY
- LED