

# Using Data to Constrain Models

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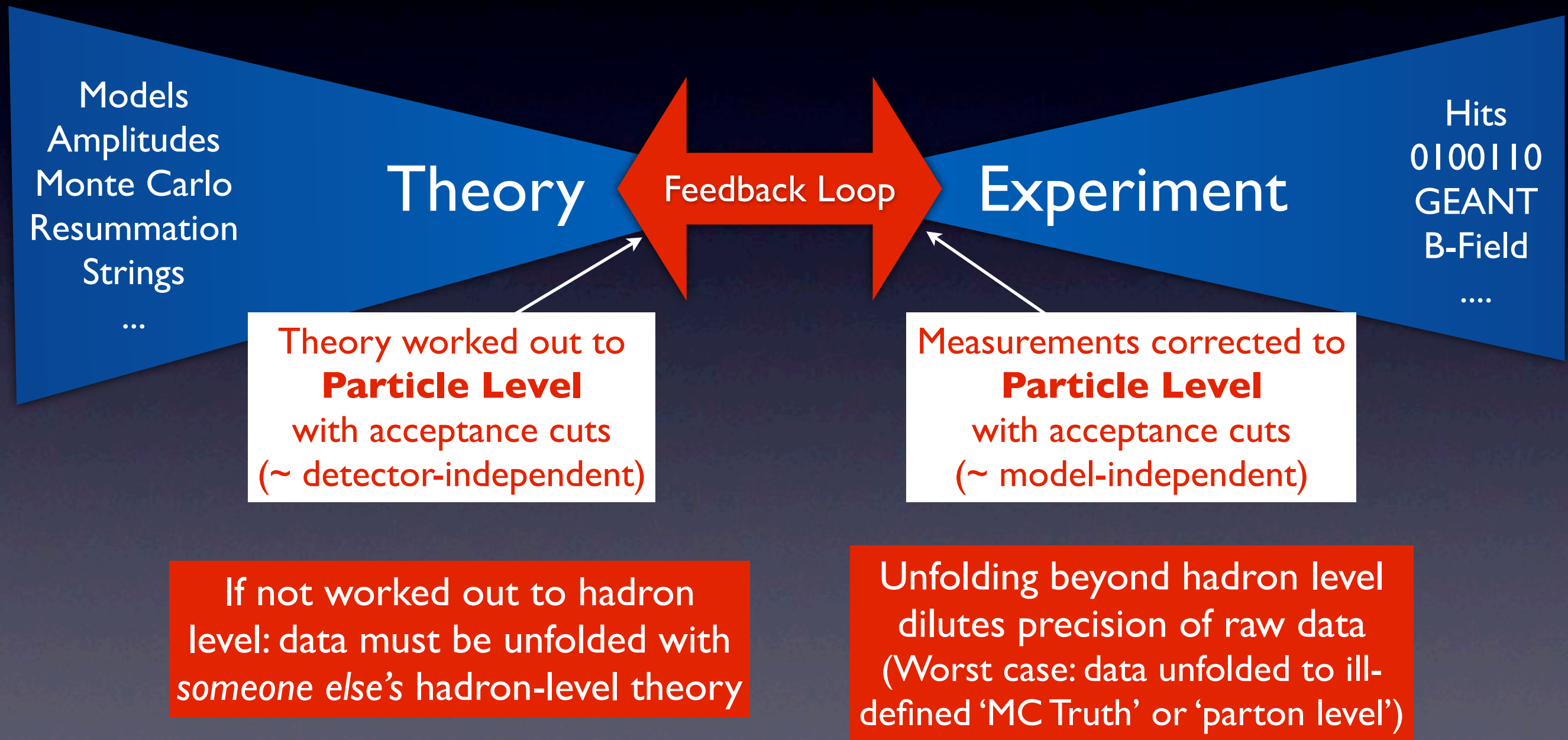
# Disclaimer



*“**It is a** huge mistake to theorize before one has data - One tends to twist fact to suit theory, instead of theory to suit fact”*

*Sherlock Holmes (2009)*

Count what is Countable  
**Measure what is Measurable**  
(and keep working on the beam) G. Galilei





# Monte Carlo Truth

- **Example:** Drell-Yan  $p_T$  distribution.
  - **Measured: final-state** leptons (+ photons)
  - **QED is “known”** - use MC/model to correct back to “True Z boson”
  - **Now can compare** to theory without QED

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# The “Q” in QED

- “MC Truth” **is**: useful indicator of dominant path.  
*Equivalent to Young knowing which slit the photon passed through!*

## In Quantum Mechanics

- **Photons emitted off** other particles *interfere* with those from Z decay - *no unique FSR correction*
- **Leptons from Z decay** may interfere with other leptons in event - *no unique lepton assignment*

- “MC Truth” **is not**: quantum mechanically meaningful

See also Hesketh et al., in arXiv:1003.1643



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- Using such tables, (the inverse of) such corrections could also be applied to allow direct comparisons of other models to the data while maintaining the separation of measurement and theory

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