UCLouvain
Institut de recherche en mathématique et physique
Centre de Cosmologie, Physique des Particules et Phénoménologie

Aera 2 : Predictions and tools

Celine Degrande for the conveners

Plan

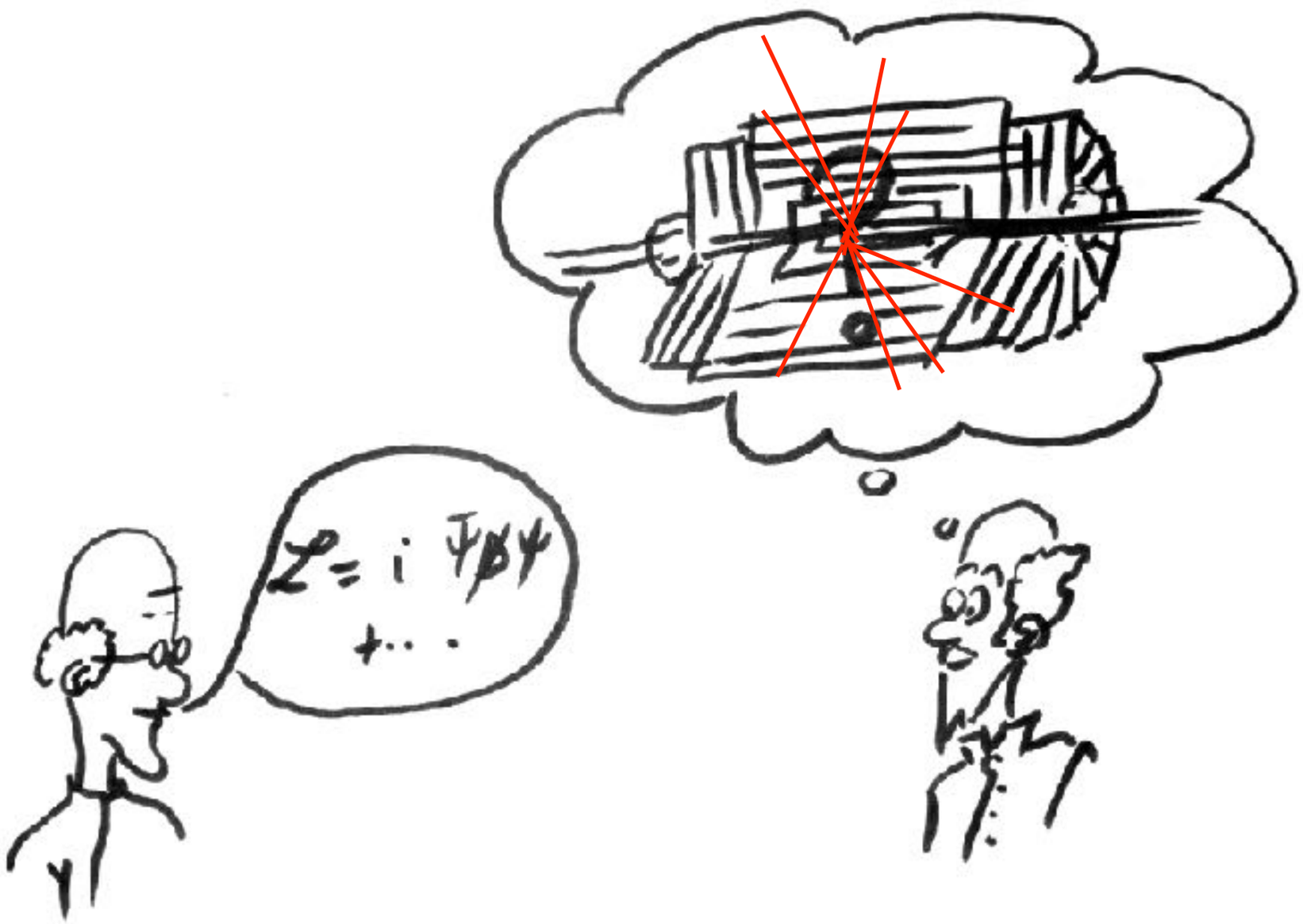
- Introduction
- What is out there and can be done?
- Experimentalists experiences and wishlist
- To discuss/to contribute

Introduction

Disclaimer

- no basis choice
- no(t much) $1/\Lambda^4$ from dim-6 discussion
- no(t much) EW parameters

Why do we need predictions and tools?



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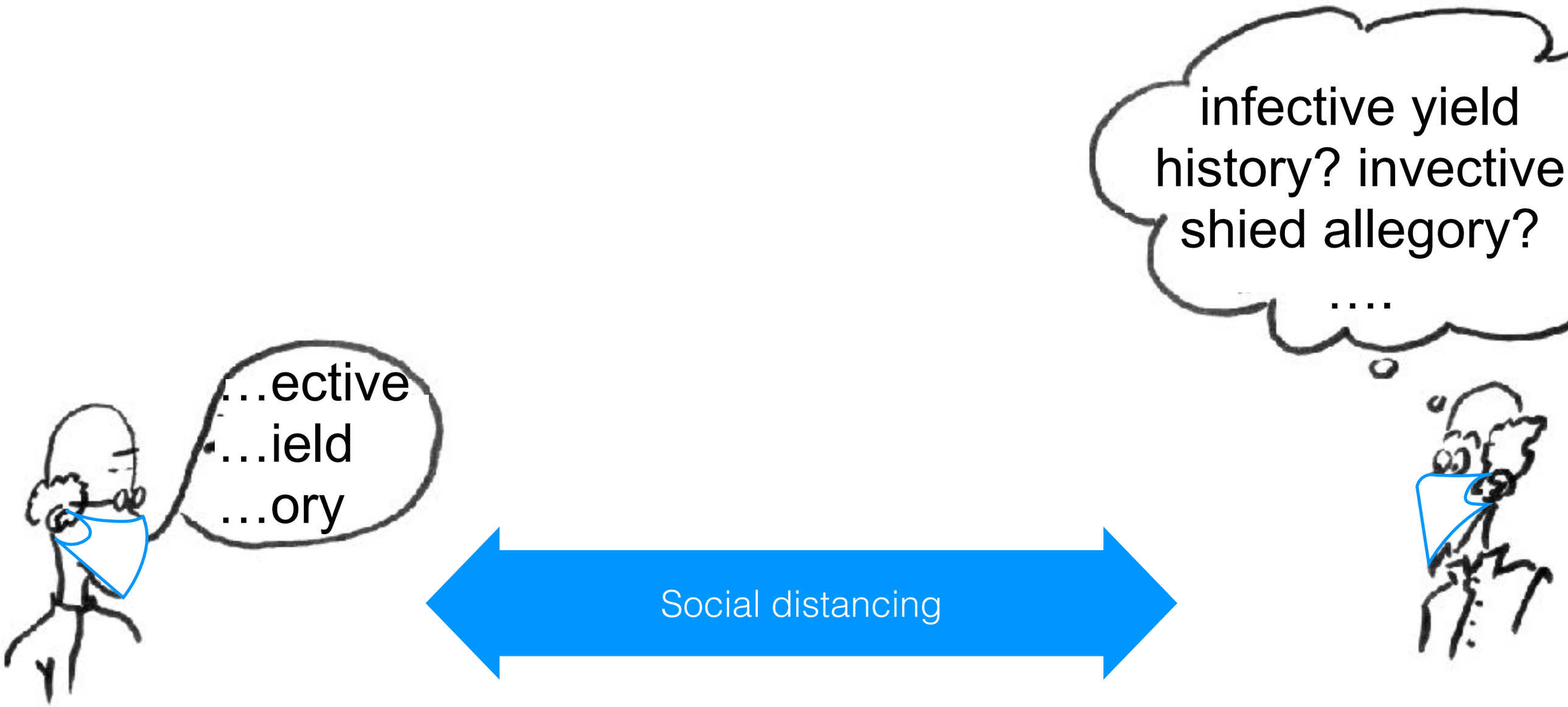
Why do we need them more than ever?



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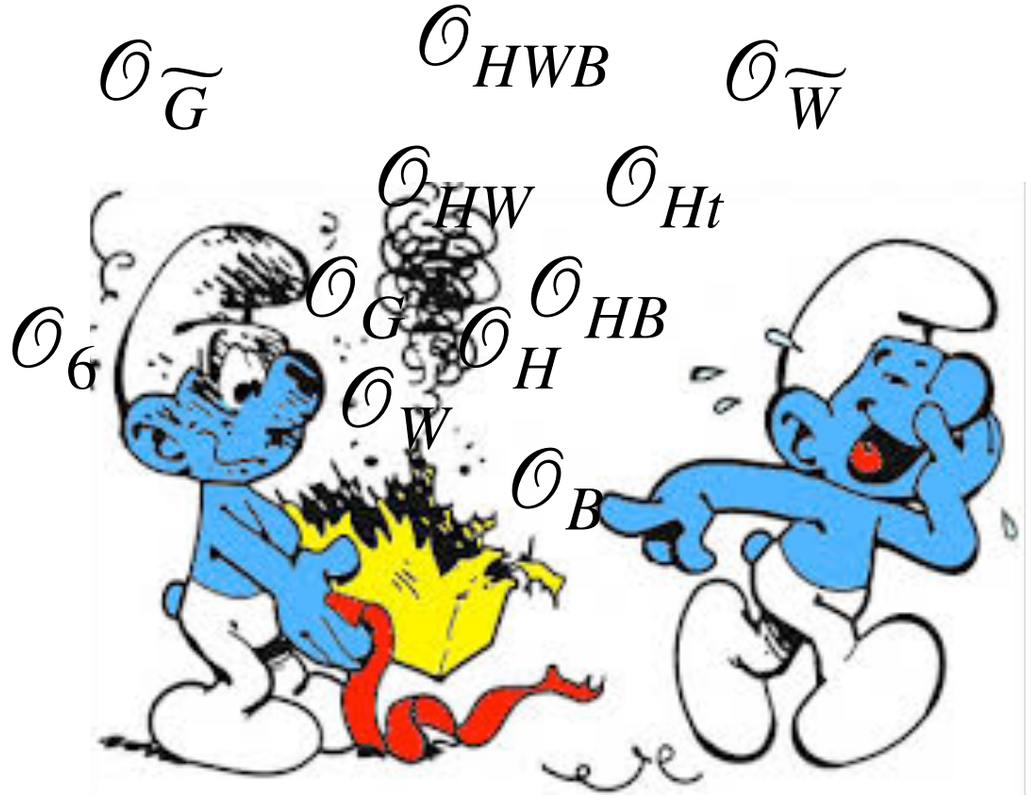
One Lagrangian, many parameters



- even more true with :
  - more loops
  - decays
  - backgrounds
  - …

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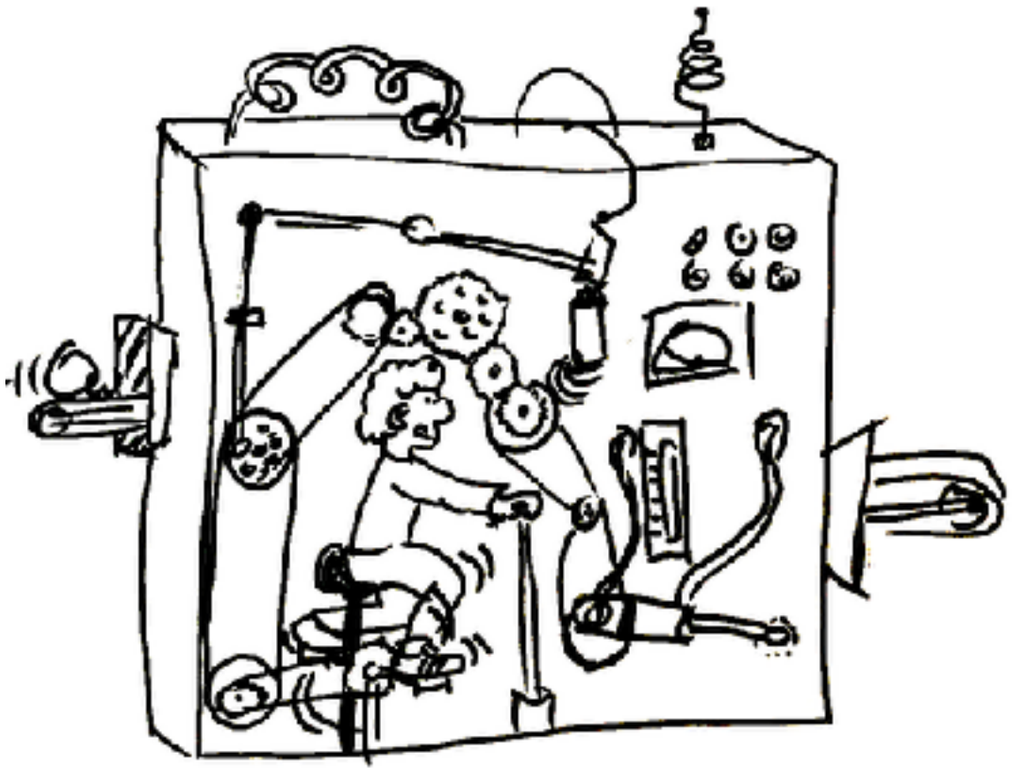
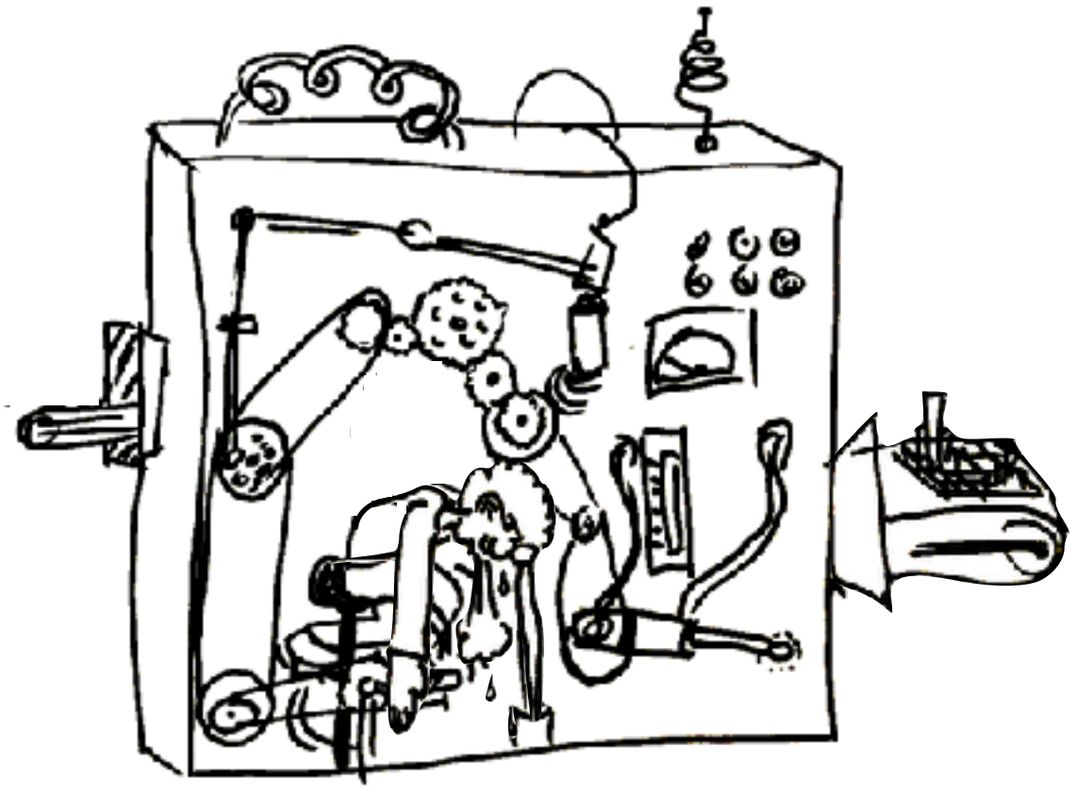
Each additional parameter takes a lot of time and efforts

From an operator



To the detector level



Need for fast and efficient tools

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From observables to optimised studies

- From theorists fits of observables measurements to experimental combinations
- model dependence vs best limits
  - including higher order contribution
  - EFT validity
  - acceptance
  - …
- do both (and intermediate) options (Ressources)

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What is out there and can be done?

1st meeting: review of the tools

https://indico.cern.ch/event/971724/

- SMEFTSim
- SMEFT@NLO
- MadGraph5_aMC@NLO
- Sherpa
- JHUGen
- Powheg
- VBF@NLO

Models and features for EFT (re-weighting, decay, optimal observables, …)

Output: List of capabilities but to be kept up to date by the authors

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Predictions

- Output: List of all the publications (by the authors)
- Constantly changing: Dynamical
- Which information:
  - Pub ID (authors, arxiv, journal,…)
  - List of operators
  - List of processes or theory subjects (axial anomaly, RGE, …)
  - List of observables
  - order of the couplings
  - …

Comparison & validation

CALL for INTERESTS

- SMEFT@NLO vs SMEFTsim @ LO (1906.12310)
- MadGraph5_aMC@NLO vs SHERPA?
- Re-weighting vs full simulation
- Full final state vs on-shell+decay
- Tools vs published results
- Others?

NLO issues to be discussed

- K-factor (non-)universality
- running
- At which precision does the EW parameters scheme start to matter
- Flavour symmetry
- Uncertainties
- …

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Experimentalists experiences and wishlist

Experimentalists experiences and wishlist

- Method used:
  - Benchmark points
  - ME re-weighting
  - Gen-level parametrisation/unfolded meas.
- Concerns
  - higher order term (prod+decay)
  - NLO
  - Parameters dependence (fit, re-weighting,…)
  - comparison |b| tools/predictions
  - assumptions
  - EFT gluon interactions

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To discuss/to contribute

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- List of publications: which information
- Validation/comparison
- NLO issues

Where is new physics?

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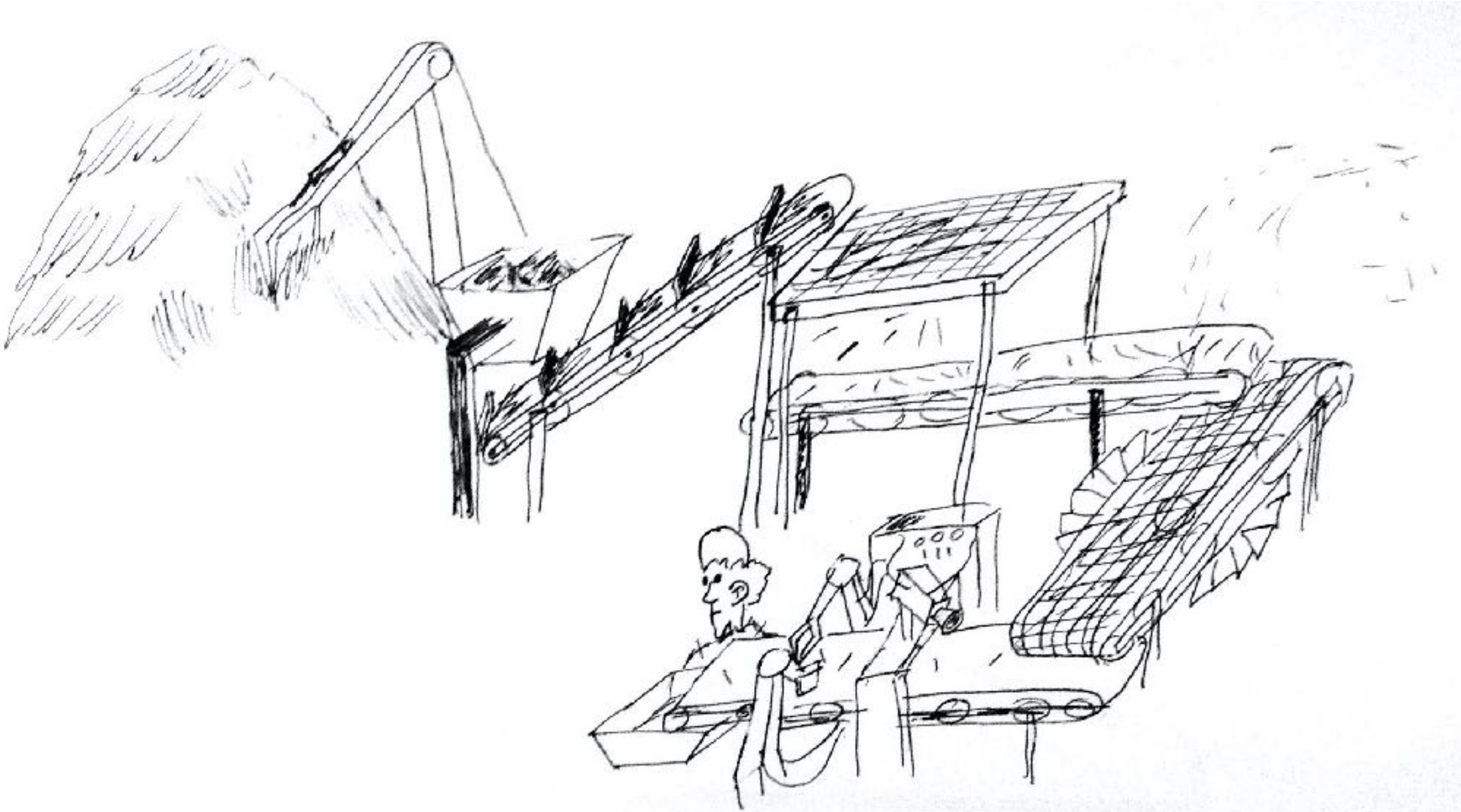
Automated tools



Thank you

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