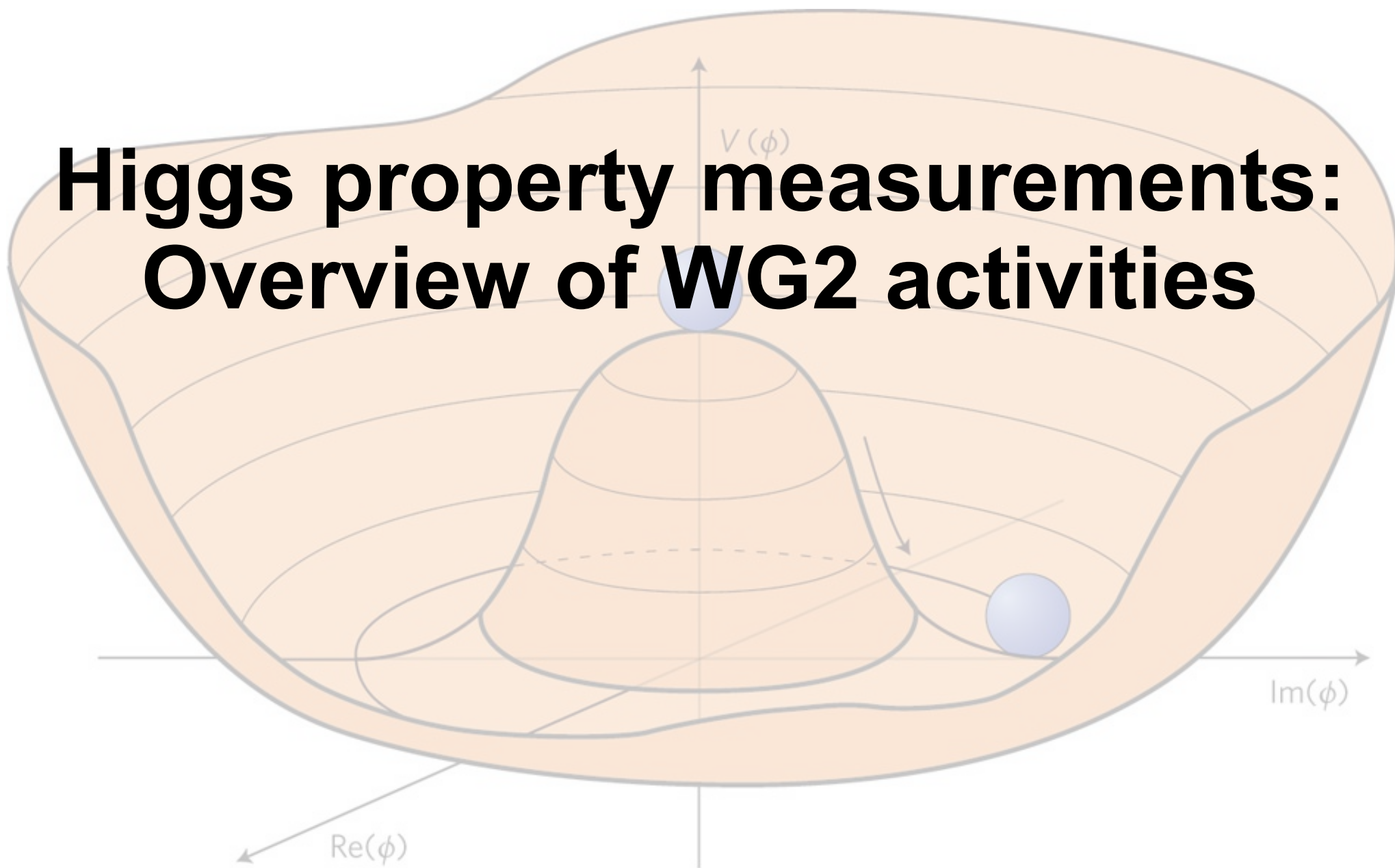


Higgs property measurements: Overview of WG2 activities



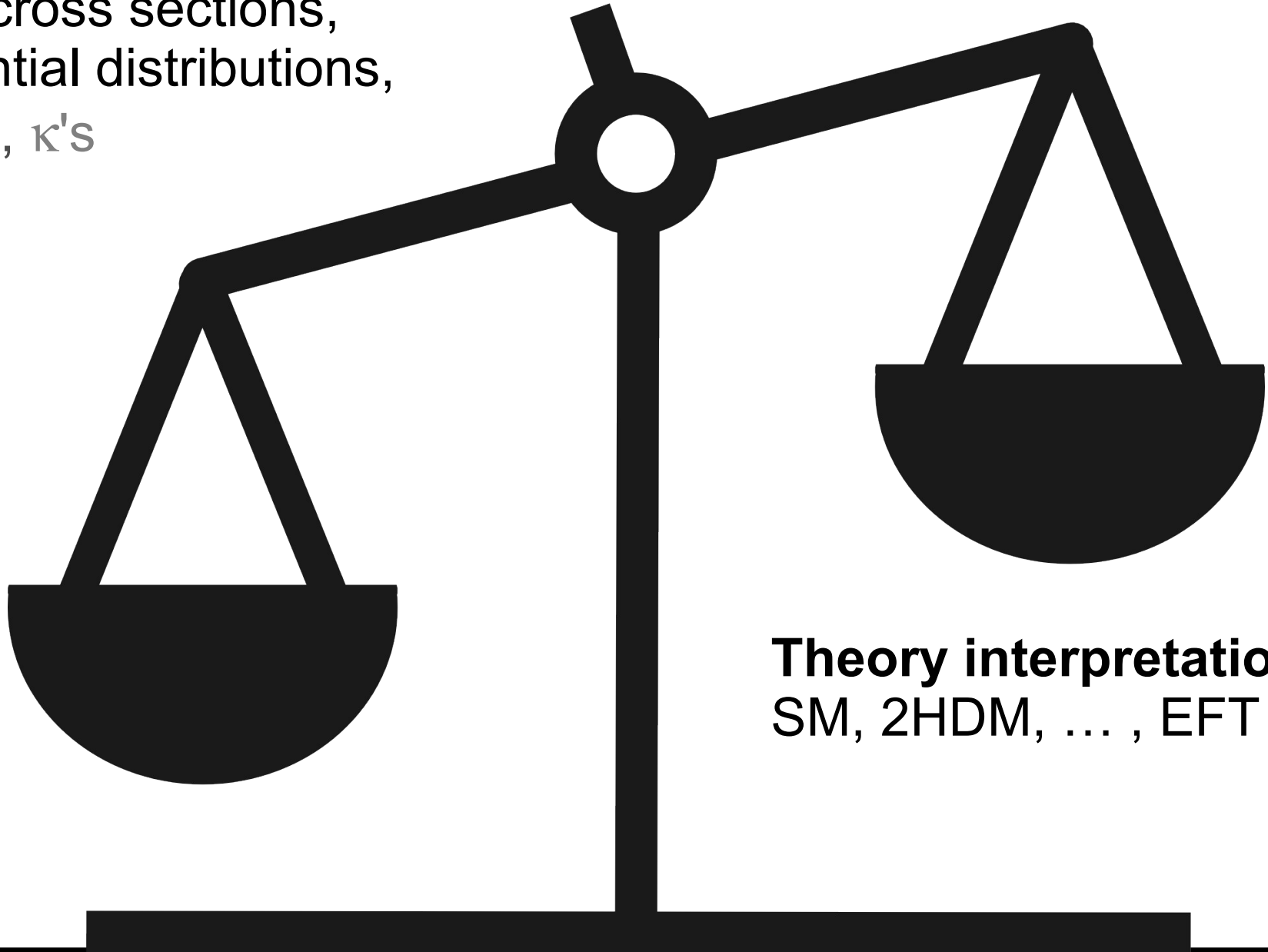
Michael Duehrssen

LHC Higgs XS WG workshop, 15th July 2015

Higgs property measurements

Measurements:

Higgs cross sections,
differential distributions,
... , μ 's, κ 's



Theory interpretation:
SM, 2HDM, ... , EFT

What is the core question in WG2?

Status: LHC Run 1 measurements exceeded most expectations. But almost all measurements were either:

- **Rate based:** σ 's, μ 's, κ 's (assume SM kinematic distributions)
- or
- **Shape based:** AC's or EFT in decay distributions (ignore rates)

Many BSM theories predict deviations from the SM in both rates and shapes.

- **Common goal for Run 2:** make measurements that exploit the full information from observed rates and shapes.
- **How?** Three proposals being worked through

**Fiducial
cross sections**

**Pseudo-
observables**

EFT

WG2 activities

**Fiducial
cross sections**

**Pseudo-
observables**

EFT

Model independence

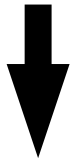
“Power” of measurement

WG2 activities

**Fiducial
cross sections**

**Pseudo-
observables**

EFT



- **Most general and least model dependent measurements**
- Limited availability: so far only $H \rightarrow \gamma\gamma$ and $H \rightarrow ZZ$. Other channels will be difficult
- Limited “power”: most advanced experimental techniques (MVAs) and categorizations not applicable
- **Discussion organized in “Fiducial cross section” task force together with WG1 → see report on Friday**

WG2 activities

**Fiducial
cross sections**

**Pseudo-
observables**

EFT



- **General framework for the interpretation of Higgs+non-Higgs measurements in the absence of light BSM physics**
 - Discussion of linear “Higgs basis” and translation between different bases. Extension to non-linear EFT?
 - Discussion of NLO EFT calculations (both NLO QCD and consistent NLO EW treatment of EFT, also inside loops)
 - Was (and will likely be) used directly for experimental results
 - Measurement of subsets of Wilson coefficients in some basis

WG2 activities

**Fiducial
cross sections**

**Pseudo-
observables**

EFT



- **Middle ground between experiment and theory**
- Theory: only little residual SM theory dependence
- Experiment: can use most advanced experimental techniques (MVAs) and categorizations (but many parameters to measure)
- Currently two incarnations envisioned
 - Simplified/template cross sections
 - Physical pole decomposition/expansion
- Well defined and standardized interface between theo. and exp.