

ESR 15

▶ Host: ETH Zurich

- ▶ Period: October 2014 - September 2017, 24 months funded by HiggsTools, 12 months funded by ETH (G. Dissertori's personnel budget).
- ▶ Junior ESR (PhD Position), WP3 (Task 3.1) with close links to WP1 and WP2
- ▶ Supervisor: Günther Dissertori (ETH Zurich)
 - ▶ Co-Supervisors:
Exp: Rainer Wallny (ETH Zurich), Florencia Canelli (Univ. Zurich)
Theo: Stefano Pozzorini (Univ. Zurich)
- ▶ *The candidate will work on the substantial improvement of the sensitivity to Higgs boson production in association with top-antitop pairs ($t\bar{t}H$) and a direct measurement of the top- and bottom-Higgs Yukawa couplings, using the matrix-element analysis method.*

WHY?

- ▶ **so far at the LHC: no direct evidence for the ttH process**
- ▶ **this process gives direct access to the important top-Higgs coupling**
- ▶ LHC run at 13 TeV, starting in 2015, will deliver enough data in order to obtain such direct evidence for the first time
- ▶ The matrix-element approach to this complicated analysis (multi-particle final state) is promising in terms of improving the sensitivity and for extracting relevant parameters such as the coupling strength

WHAT?

- ▶ **will apply the matrix-element method (MEM) to the ttH analysis with CMS data**
- ▶ **will try to include and combine the MEM with boosted (Higgs, top) techniques**
- ▶ the student will profit from important expertise on these techniques, which exists in the Zurich area, as well as from the extensive expertise of the involved groups with CMS data analyses
- ▶ will seek close collaboration (e.g. in the form of secondments, FOM-Louvain, UDUR, DFTTO) with theorists in the network for:
 - ▶ possible extensions of the MEM to NLO
 - ▶ precise estimates of most relevant backgrounds, in particular tt+jets, tt+bb
- ▶ will seek collaboration with other exp. groups (e.g. in the form of secondments, FOM-Louvain, ALUF) in the network for exchange on know-how regarding MEM for ttH.