

Organization of Seminar Talks for Higgs Physics

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- We will have a paper seminar at the end of this lecture.
- It is planned to take place at the following dates:
 - Thur 07. July – Fr 08. July – Thur 14. July – Fr 15. July – Thur 21. July
- We plan one presentation per student.
- Presentations should aim at a length of 40 min (including discussion).
- We offer 10 topics. If we have higher demand, we will provide more topics and eventually re-arrange. Let us know in this case!
- **A form to fill in (as usual for a “Hauptseminar”) will be laid out in the office of Frau Bräunling Bld. 30.23 Room 9-3.**
- We will fix topics during the first Exercise (→ **EX-01 Fr 06. Mai**).

Our offer...

- We have a great team of supervisors & lecturers. All of them celebrated 4. July 2012 as their personal success since they had their own hands on the analyses that you will be talking about.
- The discussion you will have/the stuff you can learn is not only from primary literature, you can also have this literature explained/discussed from FIRST HAND, i.e. by the guys whose hands actually made this results!
- This is especially (and literally) true for all $H \rightarrow \tau\tau$ results.
- You might have a hard time to get ever closer than this to a genuine Nobel Prize measurement in physics.

...Our wish to you

- Try to really understand the papers as far as you can.
- In general what you do not understand you should be able to formulate in a question. Discuss your questions with your supervisor!
- In the presentation do not just reproduce what you have read. Try to reflect on it, to focus on points that you have learned and that you found interesting. Your supervisors will help you with the selection.
- Don't be shy. This is a discussion seminar! It will become better the more good discussion we have. Make use of the close contact to your supervisors and lecturers. This is a unique chance which is not a matter of course.
- The discussion with your supervisor is part of the learning process. We expect that you meet 2-3 times to discuss your topic in depth.

- Literature:
 - *The Higgs Boson Discovery at the Large Hadron Collider* ([Section 4.3](#)).
 - *Observation of the diphoton decay of the Higgs boson and measurement of its properties* ([arXiv:1407.0558](#), [Public TWiki page](#)).
 - *Measurement of Higgs boson production in the diphoton decay channel in pp collisions at center-of-mass energies of 7 and 8 TeV with the ATLAS detector* ([arXiv:1408.7084](#)).
 - Newest published results by both experiments.

Günter Quast (guenter.quast@kit.edu)

- Literature:
 - *The Higgs Boson Discovery at the Large Hadron Collider* ([Section 4.3](#)).
 - *Measurement of the properties of a Higgs boson in the four-lepton final state* ([arXiv:1312.5353](#), [Public TWiki page](#)).
 - *Measurements of Higgs boson production and couplings in the four-lepton channel in pp collisions at center-of-mass energies of 7 and 8 TeV with the ATLAS detector* ([arXiv:1408.5191](#)).
- Newest published results by both experiments.

Roger Wolf (roger.wolf@cern.ch)

- Literature:
 - *The Higgs Boson Discovery at the Large Hadron Collider* ([Chapter 5](#)).
 - *Measurement of the properties of a Higgs boson in the four-lepton final state* ([arXiv:1312.5353](#), [Public TWiki page](#)).
 - *Combined search for anomalous pseudoscalar HVV couplings in VH production and $H \rightarrow VV$ decay* ([arXiv:1602.04305](#), [Public TWiki page](#)).

Roger Wolf (roger.wolf@cern.ch)

Higgs properties in $H \rightarrow ZZ$ (decay width)

- Literature:
 - *The Higgs Boson Discovery at the Large Hadron Collider* ([Chapter 5](#)).
 - *Measurement of the properties of a Higgs boson in the four-lepton final state* ([arXiv:1312.5353](#), [Public TWiki page](#)).
 - *Constraints on the Higgs boson width from off-shell production and decay to Z-boson pairs* ([arXiv:1405.3455](#), [Public TWiki page](#)).

Roger Wolf (roger.wolf@cern.ch)

- Literature:
 - *The Higgs Boson Discovery at the Large Hadron Collider* ([Section 4.4](#)).
 - *Evidence for the 125 GeV Higgs boson decaying to a pair of τ leptons* ([arXiv:1401.5041](#), [Public TWiki page](#)).
 - *Evidence for the direct decay of the 125 GeV Higgs boson to fermions* ([arXiv:1401.6527](#), [Public TWiki page](#)).
 - *Bestimmung der Kopplung des Higgs Bosons an das τ -Lepton durch statistische Kombination verschiedener Produktions- und Zerfallskanäle mit Daten des CMS Experiments am LHC* ([IEKP-KA/2014-07](#)).
 - *Evidence for the Higgs-boson Yukawa coupling to tau leptons with the ATLAS detector* ([arXiv:1501.04943](#)).
- Newest published results by both experiments.

Roger Wolf (roger.wolf@cern.ch)

- Literature:
 - *The Higgs Boson Discovery at the Large Hadron Collider* ([Section 4.4](#)).
 - *Search for the standard model Higgs boson produced in association with a W or a Z boson and decaying to bottom quarks* ([arXiv:1310.3687](#), [Public TWiki page](#)).
 - *Search for the $b\bar{b}$ decay of the Standard Model Higgs boson in associated (W/Z)H production with the ATLAS detector* ([arXiv:1409.6212](#)).
 - Newest published results by both experiments.

Stefan Wayand (stefan.wayand@cern.ch)

- Literature:
 - *Search for neutral MSSM Higgs bosons decaying into a pair of bottom quarks* ([arXiv:1506.08329](#), [Public TWiki page](#)).
 - *Search for a Higgs boson decaying into a b -quark pair and produced in association with b -quarks in pp collisions at 7TeV* ([arXiv:1302.2892](#), [Public TWiki page](#)).
 - *Summary results of high mass BSM Higgs searches using CMS run-I data* ([CMS-PAS-HIG-16-007](#)).

Matthias Schröder (matthias.schroeder@cern.ch)

- Literature:
 - *Search for neutral MSSM Higgs bosons decaying to a pair of tau leptons in pp collisions* ([arXiv:1408.3316](#), [Public TWiki](#) page).
 - *Search for additional neutral Higgs bosons decaying to a pair of tau leptons in pp collisions at $\sqrt{s}=7$ and 8 TeV* ([CMS-PAS-HIG-14-029](#), [Public TWiki](#) page).
 - *Summary results of high mass BSM Higgs searches using CMS run-I data* ([CMS-PAS-HIG-16-007](#)).
 - *Search for neutral Higgs bosons of the minimal supersymmetric standard model in pp collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector* ([arXiv:1409.6064](#)).
 - Newest published results by both experiments.

Stefan Wayand (stefan.wayand@cern.ch)

Search for $H \rightarrow hh$ or $A \rightarrow Zh$ resonances

- Literatur:
 - Searches for a heavy scalar boson H decaying to a pair of 125 GeV Higgs bosons hh or for a heavy pseudoscalar boson A decaying to Zh , in the final states with $h \rightarrow \tau\tau$ ([arXiv:1510.01181](#), [Public TWiki](#) page).
 - Search for a pseudoscalar boson decaying into a Z boson and the 125 GeV Higgs boson in $\ell^+\ell^-bb^-$ final states ([arXiv:1504.04710](#), [Public TWiki](#) page).
 - Search for resonant pair production of Higgs bosons decaying to two bottom quark-antiquark pairs in proton-proton collisions at 8 TeV ([arXiv:1503.04114](#), [Public TWiki](#) page).
 - Benchmark scenarios for low $\tan\beta$ in the MSSM ([LHCHSWG-INT-2015-004](#)).

Stefan Wayand (stefan.wayand@cern.ch)

Search for $H \rightarrow inv.$

- Literature:
 - *Search for invisible decays of Higgs bosons in the vector boson fusion and associated ZH production modes* ([arXiv:1404.1344](#), [Public TWiki page](#)).
 - *Constraints on new phenomena via Higgs boson couplings and invisible decays with the ATLAS detector* ([arXiv:1509.00672](#)).
 - Newest published results by both experiments.

Günter Quast (guenter.quast@kit.edu)