The Zeuthen ATLAS group

- 2 staff members: Thorsten Kuhl, KM
- One YIG: Priscilla Pani with 1 postdoc (Alvaro Lopez Solis) and 2 PhD students (Marawan Barakat, Eleonora Loiacono) plus 1 postdoc for KRANOS (Sana Tabbassum) and one postdoc from Upgrade (Ben Brüers)
- One joint appointment with HUB (C. Issever)
- 3 Postdocs (Evgeniya Cheremushkina, Clara Leitgeb, Oliver Majersky)
- 5 PhD students (Yusuf Cekmecelioglu, Cédrine Hügli, Sadia Marium, Fred Renner, Supriya Sinha)
- 2 master students (Lukas Roscher, Erik Dieckow (formally HUB))
- Upgrade is organised in a separate group (I. Bloch)
- The Zeuthen ATLAS group is closely connected to the Hamburg counter part

Our physics program

- Higgs physics
 - Elementary scalars are a completely new concept in particle physics
 - Essential to understand the development of the early universe incl. baryogenesis
 - Large top-Yukawa coupling and Higgs self-coupling which determines the Higgs potential especially important
- Dark matter searches
 - Identity of dark matter is a key issue for our understanding of the universe
 - LHC complementary to other methods and only in combination we can understand what dark matter is
- Forward cross sections
 - Large uncertainties in the knowledge of forward particle production in high energy hadron collisions
 - These uncertainties largely limit the accuracy of air-shower Monte Carlos
 - LHC has the possibility to improve this significantly

Analysis topics in Zeuthen

- Top quarks:
 - Top Yukawa coupling from tt cross section near threshold (TK, KM, EC, (OM), SS, SM)
 - First run tī cross section at 13.6 TeV (KM, OM, CH)
 - WbWb cross section (PP, BB, EL)
- Di-Higgs
 - Resonances in $HH \rightarrow 4b$ (Cigdem's ERC grant at HUB) (CI, CL, FR)
 - HH \rightarrow bbyy (In the startup phase) (KM, OM, CH)
- Dark matter searches
 - Supersymmetry and flavoured dark matter in final states with t and c quarks (PP, AL, MB)
 - Statistical combination of dark matter searches with heavy flavour quark(s) (PP, AL)
- Forward physics
 - Measurement of very forward scattering with LHCf, ZDC and AFP (CI, CL, YC)
 - Study and comparison of current heavy ion event generators for proton-Oxygen collisions at LHC (ED)

Technical topics in Zeuthen (i)

Tracking

- Alignment (TK)
- Impact parameter resolution (TK, SS)
- Flavour-tagging
 - Calibration of bottom and charm flavour tagging algorithms (AL, MB, EL)
 - Calibration of soft bottom quark tagging algorithms (PP, AL)
 - Automation of calibration software and smoothing of results (AL, MB, EL)
 - Using soft muons for b-jet identification (FR)
 - Developing b-tagging for VR-track jets (FR)

Technical topics in Zeuthen (ii)

Luminosity

- Analysis of vdM scans at 13.6 TeV (KM, OM, CH)
- SCT operations
 - Prompt calibration loop (EC)
- AFP
 - Offline monitoring (YC)
 - Software & simulation (CL)
- Medical physics
 - Stroke detection with Potassium (PP, ST)