

# Universität Siegen - Theoretical Particle Physics Group

Nico Gubernari

Jahrestreffen der deutschen LHCb-Gruppen  
TU Dortmund, 7-Oct-2021



Particle Physics Phenomenology after the Higgs Discovery



# Group overview

~40 members in total

(including Emeriti professors  
and Master students)

- 13 senior members
- 7 Postdocs
- 11 PHD students

Close collaboration among all members!

## Main topics

- *B*-meson decays  
(inclusive and exclusive)
- Effective theories (HQET, SMEFT, SCET)
- QCD calculations (multi-loop calculations,  
Lattice QCD, and sum rules)
- Collider physics

# Guido Bell & co.

Multiloop QCD calculations

LHC phenomenology

Non-leptonic  $B$  decays in QCD factorization

$\alpha_s$  determination from  $e^+e^-$  event shapes

Applications of SCET in flavor and jet physics



Guido Bell  
(Senior)



Jan Piclum  
(Senior)



Goutam Das  
(Post-doc)



Kevin Brune  
(PhD)



Marcel Wald  
(PhD)

# Thorsten Feldmann & co.

Phenomenology of rare  $B$  and  $\Lambda_b$  decays

NP interpretation of flavor anomalies

Light-cone distribution amplitudes and form factors of  $B$  mesons



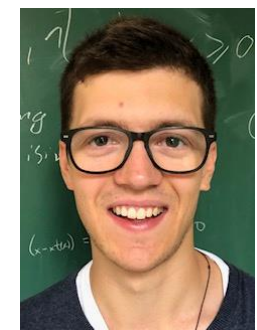
Thorsten Feldmann  
(Senior)



Oscar Cata  
(Senior)



Nico Gubernari  
(Post-doc)



Nicolas Seitz  
(PhD)



# Tobias Huber & co.

non-leptonic  $B$  decays

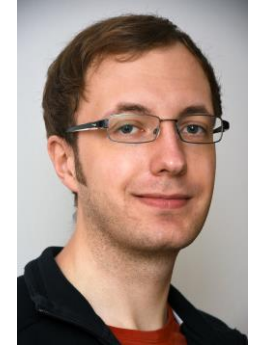
FCNCs decays  $B \rightarrow X_{(s,d)}\{\ell^+\ell^-, \gamma\}$

Effective field theories

Multi-loop computations



Tobias Huber  
(Senior)



Robin Brüser  
(Post-doc)



Gilberto T. Xolocotzi  
(Post-doc)



Lars T. Moos  
(PhD)

# Wolfgang Killian & co.

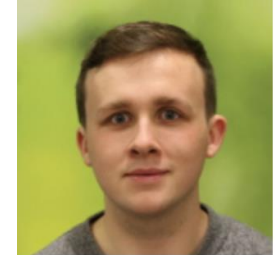
Monte Carlo based event  
generator—WHIZARD and SHERPA  
for  $e^+e^-$  colliders

SMEFT

Electroweak physics



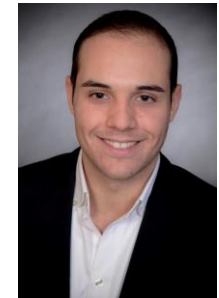
Wolfgang Killian  
(Senior)



Alan Price  
(Post-doc)



Nils Kreher  
(PhD)



Tobias Striegl  
(PhD)

# Alexander Lenz & co.

$B_s, B_d$  mixing

$D$  mixing

Lifetimes of heavy hadrons

CP violation in charm decays

Exclusive semileptonic decays on Lattice

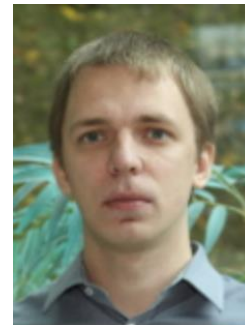
FCNC  $b \rightarrow d\ell\ell$



Alexander J. Lenz  
(Senior)



Oliver Witzel  
(Senior)



Aleksey V. Rusov  
(Post-doc)



Maria L. Piscopo  
(PhD)



Matthew Black  
(PhD)

# Thomas Mannel & co.

$V_{cb}$  QCD corrections and Heavy quark expansion

$B \rightarrow D^{\{*,**\}}$  FFs with LCSR

CP violation in  $B^+ \rightarrow \pi^+ \pi^- \pi^-$

$B \rightarrow X_{(c)} \ell \bar{\nu}$  analysis

$V_{ub}$  exclusive and inclusive

Exclusive  $B_c$  and  $\Lambda_b$  decays



Thomas Mannel  
(Senior)



Alexander  
Khodjamirian  
(Senior)



Alexei Pivovarov  
(Senior)



Björn O. Lange  
(Senior)



Rusa Mandal  
(Senior)



Daniel Moreno  
(Post-doc)



Kevin Olschewsky  
(PhD)



Muslem Rahimi  
(PhD)



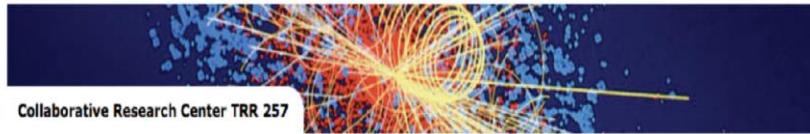
Hua-Yu Jiang  
(PhD)



# External collaborations

**DFG**

Particle Physics Phenomenology after the Higgs Discovery



Karlsruher Institut für Technologie



**RWTHAACHEN**  
**UNIVERSITY**



Thank you!