Project 5:
QCD and Effective Theories
for Nonleptonic Decays
(Status and Prospects)

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Theor. Physik 1

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Achievements/publications in P5

- G. Hiller, M. Jung, S. Schacht
  "SU(3)$_F$ in nonleptonic charm decays"
  QFET-2013-11, arXiv:1311.3883, PoS EPS-HEP2013 (2013) 371

- G. Hiller, M. Jung, S. Schacht
  "Sharper predictions for $D \to PP$ CP asymmetries"
  QFET-2013-12

- S. Kränkl, TH
  "Towards NNLO corrections in $B \to D\pi$"
  QFET-2014-07, arXiv:1405.5911, proceedings ITEP Winter School

- Th. Feldmann
  "Non–leptonic Heavy Meson Decays - Theory Status"
  QFET-2014-12, arXiv:1408.0300, proceedings FPCP

- G. Bell, TH
  "Master integrals for the two–loop penguin contribution in non-leptonic B-decays"
  QFET-2014-18, arXiv:1410.2804, accepted by JHEP

- TH
  "Non-leptonic B-decays at two-loops in QCD"
  QFET-2014-19, arXiv:1410.3496, PoS LL2014 (2014) 037

- M. Poradzinski, J. Virto, TH
  "Four–Body contributions to $\bar{B} \to X_s\gamma$ at NLO"   *→ also to P4*
  QFET-2014-22, arXiv:1411.7677, submitted to JHEP

Current Activities in P5

- G. Bell, M. Beneke, X.-Q. Li, TH:
  Penguin amplitudes in QCD factorization at NNLO

- S. Kränkl, TH:
  The decay $B \to D\pi$ at NNLO in QCDF

- Th. Mannel, S. Kränkl, D. Rosenthal, J. Virto, TH:
  Three-body nonleptonic decays
  $\longrightarrow$ See Susanne's talk

- Th. Feldmann, D. van Dyk
  $B \to \pi\pi\ell\nu$ at large Di-pion masses
  $\longrightarrow$ See Thorsten's talk

Goals

	Topic	Tasks	Schedule
5a	NNLO Two-Loop Corrections in QCDF	penguin amplitudes	year 1-2
		massive final state ($B \to D\pi$)	year 2-3
		power suppressed amplitudes	year 4-5
5b	Nonperturbative Input for QCDF/SCET	extension of SCET framework I (FF, LCDA)	year 2-3
		extension of SCET framework II	year 5-6
5c	Flavour-Symmetry Analysis and Final State Rescattering	flavour-symmetry analysis	year 2-3
		general methods of hadron phenomenology	year 4-6
5d	Nonleptonic D-Decays	two-body decays enhanced power corr.	year 2-3
		three-body decays Dalitz plot	year 3-4

Prospects

- New projects
  - Combination of factorisation and flavour-symmetry approach. Group-theoretical classification of power-suppressed operators.
    - Martin Jung, Javier Virto, TH
  - . . .

- Strategy of project in 2nd period
  - Master Code for nonleptonic decays, including all correlations. Can be used by experimenters (LHCb, Belle II, . . .), model builders . . .
  - Interplay with G. Bell