

Heavy Quark Effective Theory: a predictive EFT on the lattice

short notes

R. Sommer

*John von Neumann Institute for Computing (NIC), DESY,
Platanenallee 6, 15738 Zeuthen, Germany*

&

*Institut für Physik, Humboldt-Universität zu Berlin, Newtonstr. 15,
12489 Berlin, Germany*

25 July 2017

*Lectures at the Summer School on
“EFT in Particle Physics and Cosmology”
Les Houches, July 3–28, 2017*

Contents

1 Lattice for EFTs, EFTs for the lattice, and EFT on the lattice	vi
2 Heavy Quark Effective Theory at zero velocity	ix
2.1 Lagrangian and propagator	ix
2.2 Symmetries	x
3 Non-perturbative formulation of EFT	xii
3.1 EFTs with an intrinsic cutoff	xiii
4 Renormalization of HQET	xv
4.1 At leading order in $1/m_b$	xv
4.2 At higher orders in $1/m_b$	xviii
5 The lattice formulation	xix
5.1 HQET on the lattice	xx
6 Non-perturbative HQET	xxii
6.1 $1/m_b$ -expansion of correlation functions, masses, and matrix elements	xxii
6.2 Strategy for non-perturbative matching	xxiv
7 Messages	xxvii