# Workshop on b --> s ll processes

**Tuesday 1 April 2014 - Thursday 3 April 2014**

**Blackett Laboratory**

# Scientific Programme

# Current assumptions in LCSR and Lattice calculations

Convenor: Sebastian Jaeger.

Contributors: Alex Khodjamirian, Stefan Meinel.

Minutes: Martino Borsato.

The theory of exclusive b->s l l transitions relies crucially on non-perturbative input, most importantly
form factors. In addition there are contributions which cannot be expressed as local operator matrix elements (such as "long-distance charm loops" and duality violation.) For comparing the data to SM (or beyond) it is important to understand this qualitatively and quantitatively. We should probably
focus on the form factors; duality violation and high-q2 OPE will be discussed in another session, although the long-distance charm at low-q2 might fit here.
We plan to discuss ast least the following points, not necessarily always in that order, although I think
it makes sense to split the session in two parts on LCSR and lattice, respectively given the methods and quantities calculated have small overlap.
1) LCSR calculations [led by Alexander Khodjamirian] - long-standing key method for low q2
2) Lattice calculations [led by Stefan Meinel] - high q2, relatively recent for B->K*, more established in B->K
In both cases:
a) Basic assumptions that go into the calculations; contrasting different methods
b) How are the error budgets estimated and what is the rationale behind it
c) Any tacit assumptions that may not fully be reflected in error budget (eg q2 parameterisation, spurious
correlations of different form factors, ...)
d) Impact on comparing theory to data. For example, to what extent can optimising observables based on existing error estimates "defeat" the error estimates? [cf c)]
e) anything else you can think of (roadmap to progress…?)
If anyone else feel anything else should be discussed please let me and the contributors know. One possible point is
3) In what way can we make use of other calculations (local sum rules, potential models, …) ? (Eg cross-checks?)

# Reconciling theory and experimental measurements

Convenor: Mitesh Patel.

Contributors: Uli Haisch, David Straub, Nicola Serra.

Minutes: Sam Cunliffe.

Experimental: Will show measurements up until now and re-iterate treatment of the S-wave component of the "K*".
Theory: Status of the SM predictions and their related uncertainties. The open and controversial issues.

# Next steps for form factor calculations and their uncertainties

Convenor: Aoifi Bharucha.

Contributors: Lars Hofer, Christoph Bobeth.

Minutes: Samuel Coquereau.

1) Brief overview of the current status of form factor calculations possible improvements:
Christoph Bobeth will review the current LCSR and Lattice status, and also discuss various FF bases and extrapolation techniques, highlighting potential issues.
2) Discussion of the iscuss the issue of factorizable power corrections to soft form factors:
Lars Hofer will discuss the stragegy proposed in section 3.1 of 1212.2263, and propose a slightly different approach.

# Broad resonances in dilepton spectra

Convenor: Danny van Dyk.

Contributors: Sebastian Jaeger, Tom Blake.

Minutes: Tamsin Nooney.

1. The experimental situation and its interpretation. What has been observed? How are experimental and theoretical quantities related? What assumptions have been made?
2. The low recoil OPE and quark-hadron duality. What does the low recoil OPE predict? What is meant by quark-hadron duality, and how does it relate to the OPE?
3. Hadronic models and estimation of duality violation. How can one progress beyond the OPE with hadronic models? What can we learn from the experiment?

# How to validate experimental results and theoretical calculations

Convenor: Ben Pecjak.

Contributors: Roman Zwicky, Quim Matias

Minutes: Samuel Coquereau.

# Measurement of inclusive decay rates and lepton angle

Convenor: Mikolaj Misiak.

Contributions: Martin Gorbahn, Patrick Owen.

Minutes: Sam Cunliffe.

# What are the next theoretical and experimental activities

Convenor: Akimasa Ishikawa.

Contributions: Marie-Helene Schune, Gudrun Hiller.

Minutes: Tamsin Nooney.

1. b->sll observables in near future (Babar, Belle and LHCb) and
after 10 years (Belle II and upgraded LHCb)
What measurement could be expected in a few years?
i) inclusive b-Hadron -> X mumu
ii) low q^2 region in B->K*ee
iii) helicity decomposition of B->Xsll
iv) others?
(p> v) which observables is not measured by Belle, Babar and LHCb?
How precisely observables are measured at Belle II and upgraded LHCb?
2. Measurements other than b->sll
To understand the physics in b->sll much deeper, what measurements other
than b->sll are needed?
i) What is the role of the CKM counter process b->dll?
ii) b->(s,d)gamma?
iii) Bs->mumu?
iv) others?

# How to transfer experimental result to theorists

Convenor: Tom Blake.

Contributors: Kostas Petridis, Danny van Dyk.

Minutes: Martino Borsato.

1. How the data is used right now? What information is made available from the experimental side? How is this information used in global analyses?
2. How should we proceed in the future? What information would you ideally want for a global analyses? How could we make best use of the experimental information that we have?
3. What experimental information do we / could we have that is not presently used in global analyses?