

Measuring γ in $B^\pm \rightarrow (K^+ K^- \pi^+ \pi^-)_D K^\pm$ decays

Martin Tat

Oxford LHCb

20th November 2020

Outline

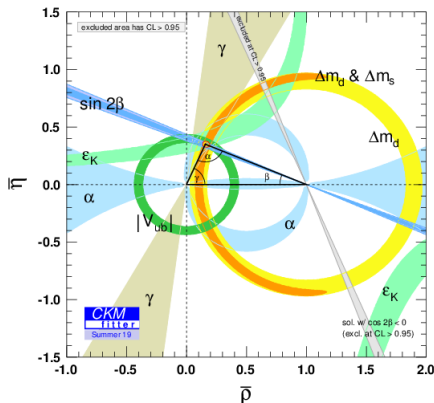
- 1 Background
- 2 γ and the unitary triangle
 - The ch
- 3 Using chemistry packages with \LaTeX
 - Chemical equations with `mhchem`
- 4 Where to go next...

- 4-year MPhys in Oxford
 - Performance of monolithic CMOS sensors
 - Prof Daniela Bortoletto
- CERN Summer Student 2019
 - Beam loss reduction in TT20 transfer line
 - Dr Yann Dutheil, Dr Matthew Fraser
- Oxford Summer Student 2018
 - Study of PDF uncertainties in W-boson mass measurement
 - Prof Chris Hays
- RAL Summer Student 2018
 - Bending magnets in accelerator simulations (Dr Chris Rogers)

γ and the unitary triangle

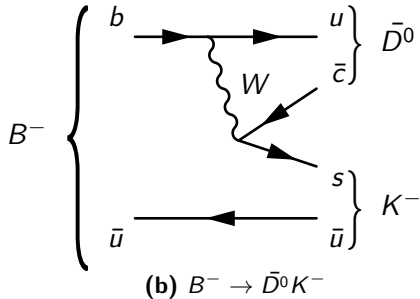
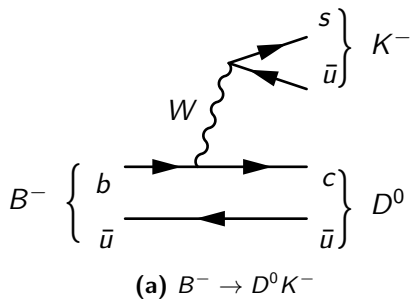
Unitarity of CKM matrix: $V_{ud}V_{ub}^* + V_{cd}V_{cb}^* + V_{td}V_{tb}^* = 0$

$$\text{Define } \gamma = \arg\left(-\frac{V_{ud}V_{ub}^*}{V_{cd}V_{cb}^*}\right)$$



CKMfitter Group (J. Charles et al.), Eur. Phys. J. C41, 1-131 (2005)

$b \rightarrow u$ and $b \rightarrow c$ interference



Similar diagrams for $B^+ \rightarrow DK^+$, with $\gamma \rightarrow -\gamma \Rightarrow$

Interference when D^0 and \bar{D}^0 decay into a common final state

The chemistry packages

We focus on two L^AT_EX chemistry packages:

The chemfig package

This package provides the command which draws molecules. Created by Christian Tellechea, a detailed user guide can be found here:

www.tex.ac.uk/ctan/macros/generic/chemfig/chemfig_doc_en.pdf

The mhchem package

The mhchem package provides simple commands for typesetting chemical molecular formulae and equations. Created by Martin Hensel, a detailed user guide can be found here:

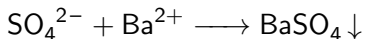
<http://mirror.ox.ac.uk/sites/ctan.org/macros/latex/contrib/mhchem/mhchem.pdf>

Chemical equations with mhchem

- The mhchem package lets you write chemical equations in L^AT_EX with the minimum of effort.
- The example below shows how the standard representation of a reaction (on the left) is created from the simple code on the right:

$\text{CO}_2 + \text{C} \longrightarrow 2 \text{CO}$ is created with `\ce{C02 + C -> 2C0}`

- More complicated reactions are still easy to write:



is created with

`\ce{S04^2- + Ba^2+ -> BaS04 v}`

Where to go next...

- This short example was designed to introduce you to using Overleaf for scientific presentations.
- This is made possible by the many great packages that have been developed for \LaTeX , including the two we focused on here (plus the Beamer package used for the overall presentation style).
- For more help on using \LaTeX , see the links on the Overleaf help page: www.overleaf.com/help or check out our free introductory course: www.overleaf.com/blog/7.

Follow @overleaf on Twitter for all the latest news and updates.

Happy \LaTeX ing!