
Overview of LHCb structure

Starterkit – 4 Nov 2020

Niels Tuning

Outline

- Once upon a time...
- Working Groups
 - Physics Analysis WG
 - Physics Performance WG
 - Liaisons
- Structure
- Review
- Deadlines

Why is Flavour Physics so cool?

- 1) Sensitive to new physics
- 2) At the heart of the Standard Model

History of Flavour physics

GIM mechanism in $K^0 \rightarrow \mu\mu$

Weak Interactions with Lepton-Hadron Symmetry*

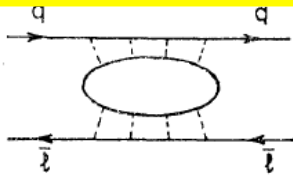
S. L. GLASHOW, J. ILIPOPOULOS, AND L. MAIANI†
 Lyman Laboratory of Physics, Harvard University, Cambridge, Massachusetts 02139
 (Received 5 March 1970)

We propose a model of weak interactions in which the currents are constructed out of four basic quark fields and interact with a charged massive vector boson. We show, to all orders in perturbation theory, that the leading divergences do not violate any strong-interaction symmetry and the next to the leading divergences respect all observed weak-interaction selection rules. The model features a remarkable symmetry between leptons and quarks. The extension of our model to a complete Yang-Mills theory is discussed.

splitting, beginning at order $G(G\Lambda^2)$, as well as contributions to such unobserved decay modes as $K_2 \rightarrow \mu^+ + \mu^-$, $K^+ \rightarrow \pi^+ + l + \bar{l}$, etc., involving neutral lepton

We wish to propose a simple model in which the divergences are properly ordered. Our model is founded in a quark model, but one involving **four, not three,** fundamental fermions; the weak interactions are mediated

new quantum number C for charm.



Glashow, Iliopoulos, Maiani,
 Phys.Rev. D2 (1970) 1285

CP violation, $K_L^0 \rightarrow \pi\pi$

27 JULY 1964

EVIDENCE FOR THE 2π DECAY OF THE K_2^0 MESON*†

J. H. Christenson, J. W. Cronin,† V. L. Fitch,† and R. Turlay§
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Progress of Theoretical Physics, Vol. 49, No. 2, February 1973

CP-Violation in the Renormalizable Theory of Weak Interaction

Makoto KOBAYASHI and Toshihide MASKAWA

Department of Physics, Kyoto University, Kyoto

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Christenson, Cronin, Fitch, Turlay,
 Phys.Rev.Lett. 13 (1964) 138
 Kobayashi, Maskawa,
 Prog.Theor. Phys. 49 (1973) 652

$B^0 \leftrightarrow \bar{B}^0$ mixing

DESY 87-029
 April 1987

OBSERVATION OF $B^0 \cdot \bar{B}^0$ MIXING

The ARGUS Collaboration

In summary, the combined evidence of the investigation of B^0 meson pairs, lepton pairs and B^0 meson-lepton events on the $\Upsilon(4S)$ leads to the conclusion that $B^0 \cdot \bar{B}^0$ mixing has been observed and is substantial.

Parameters	Comments
$r > 0.09$ 90%CL	This experiment
$x > 0.44$	This experiment
$B \frac{1}{2} t_{\text{R}} \approx \tau_{\text{L}} < 160 \text{ MeV}$	B meson (\approx pion) decay constant
$m_{\text{b}} < 5 \text{ GeV}/c^2$	b-quark mass
$\tau_{\text{b}} < 1.4 \cdot 10^{-12} \text{ s}$	B meson lifetime
$ V_{\text{td}} < 0.018$	Kobayashi-Maskawa matrix element
$\eta_{\text{CP}} < 0.86$	QCD correction factor [17]
$m_{\text{t}} > 50 \text{ GeV}/c^2$	t quark mass

ARGUS Coll.
 Phys.Lett.B192 (1987) 245

Flavour physics has a track record

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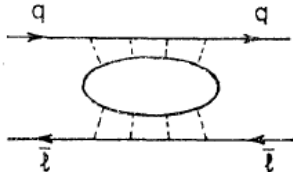
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*** DISCUSSION ***

“... phases of elements of 3×3 unitary matrix cannot be absorbed into [...] six fields ...”

CP violation implied

3rd family:

“discovery” of bottom?

$B^0 \leftrightarrow \bar{B}^0$ mixing

DESY 87-029
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OBSERVATION OF $B^0 \cdot \bar{B}^0$ MIXING

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“ $m_t > 50 \text{ GeV}/c^2$ t quark mass ”

Mixing implied

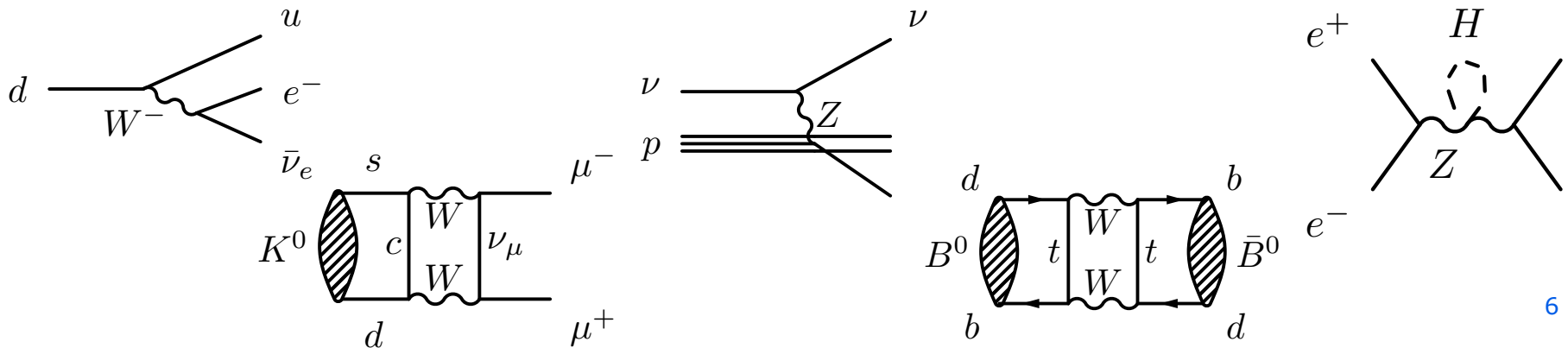
heavy quark:

“discovery” of top?

Precise flavour measurements










- Historical record of indirect discoveries:

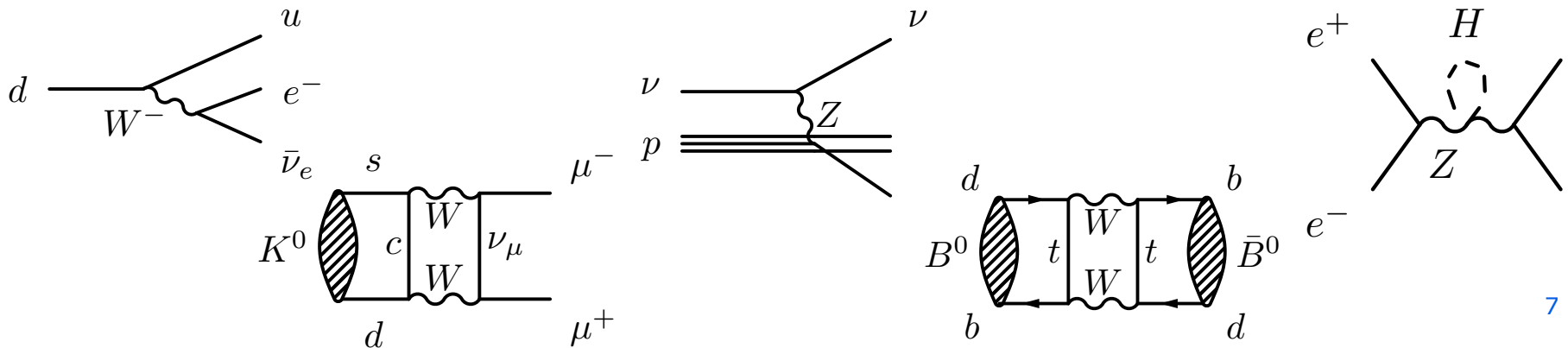
Particle	Indirect			Direct		
ν	β decay	Fermi	1932	Reactor ν -CC	Cowan, Reines	1956
W	β decay	Fermi	1932	$W \rightarrow e\nu$	UA1, UA2	1983
c	$K^0 \rightarrow \mu\mu$	GIM	1970	J/ψ	Richter, Ting	1974
b	CPV $K^0 \rightarrow \pi\pi$	CKM, 3 rd gen	1964/72	Y	Ledermann	1977
Z	ν -NC	Gargamelle	1973	$Z \rightarrow e^+e^-$	UA1	1983
t	B mixing	ARGUS	1987	$t \rightarrow Wb$	D0, CDF	1995
H	e^+e^-	EW fit, LEP	2000	$H \rightarrow 4\mu/\gamma\gamma$	CMS, ATLAS	2012
?	What's next ?					?



Precise flavour measurements

- Direct discoveries rightfully higher valued:

Particle	Indirect			Direct		
ν	β decay	Fermi	1932 	Reactor ν -CC	Cowan, Reines	1956 
W	β decay	Fermi	1932	$W \rightarrow e\nu$	UA1, UA2	1983 
c	$K^0 \rightarrow \mu\mu$	GIM	1970	J/ψ	Richter, Ting	1974 
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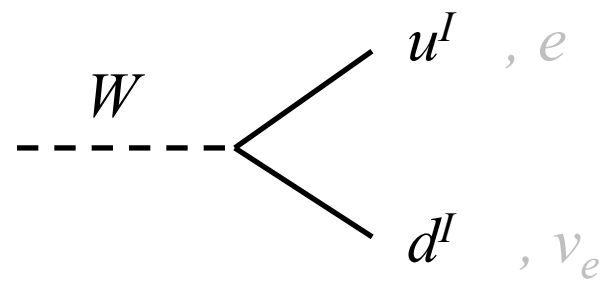


Origin of CKM

$$L_{SM} = L_{Kinetic} + L_{Higgs} + L_{Yukawa}$$

$$-L_{Yuk} = Y_{ij}^d (\bar{u}_L^I, \bar{d}_L^I)_i \begin{pmatrix} \varphi^+ \\ \varphi^0 \end{pmatrix} d_{Rj}^I + \dots$$

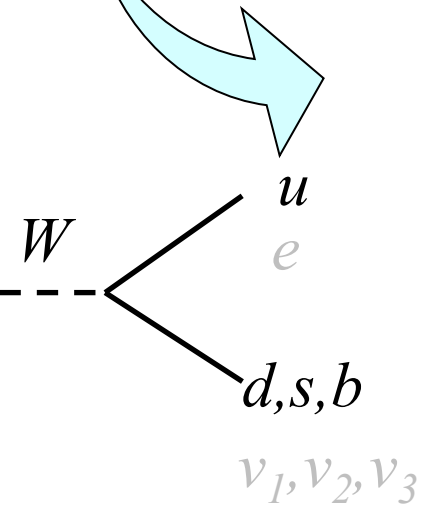
$$L_{Kinetic} = \frac{g}{\sqrt{2}} \bar{u}_{Li}^I \gamma^\mu W_\mu^- d_{Li}^I + \frac{g}{\sqrt{2}} \bar{d}_{Li}^I \gamma^\mu W_\mu^+ u_{Li}^I + \dots$$



Diagonalize Yukawa matrix Y_{ij}

- Mass terms
- Quarks rotate
- Off diagonal terms in charged current couplings

$$\begin{pmatrix} d^I \\ s^I \\ b^I \end{pmatrix} \rightarrow V_{CKM} \begin{pmatrix} d \\ s \\ b \end{pmatrix}$$



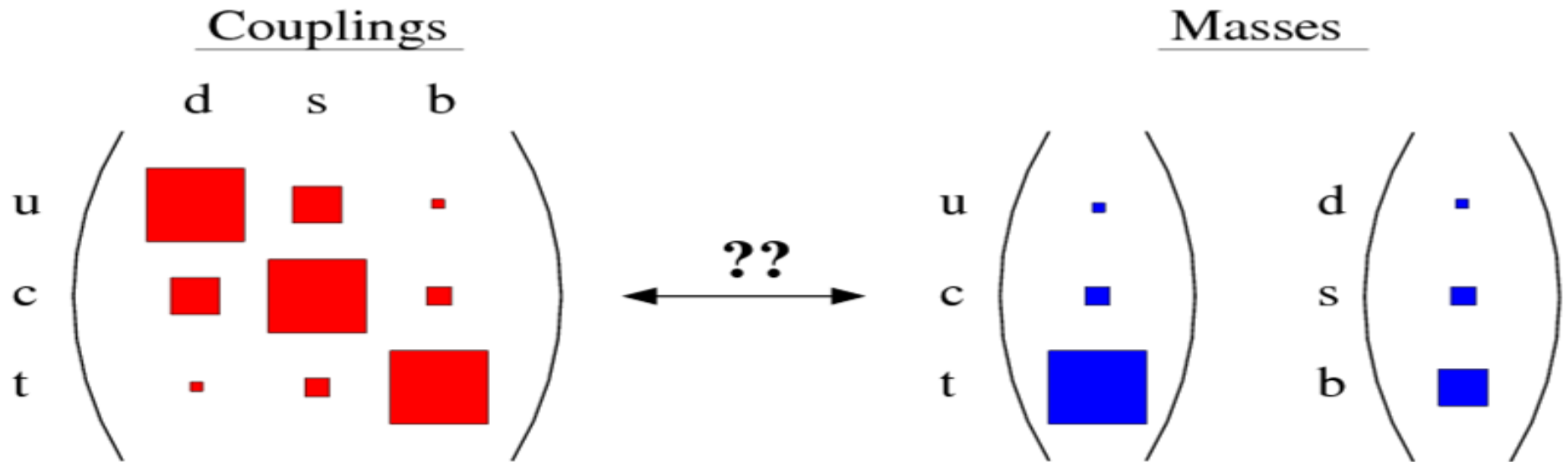
$$-L_{Mass} = (\bar{d}, \bar{s}, \bar{b})_L \begin{pmatrix} m_d & & \\ & m_s & \\ & & m_b \end{pmatrix} \begin{pmatrix} d \\ s \\ b \end{pmatrix}_R + (\bar{u}, \bar{c}, \bar{t})_L \begin{pmatrix} m_u & & \\ & m_c & \\ & & m_t \end{pmatrix} \begin{pmatrix} u \\ c \\ t \end{pmatrix}_R + \dots$$

$$L_{CKM} = \frac{g}{\sqrt{2}} \bar{u}_i \gamma^\mu V_{ij}^- (1 - \gamma^5) d_j + \frac{g}{\sqrt{2}} \bar{d}_j \gamma^\mu W_\mu^+ V_{ij}^* (1 - \gamma^5) u_i + \dots$$

$$L_{SM} = L_{CKM} + L_{Higgs} + L_{Mass}$$

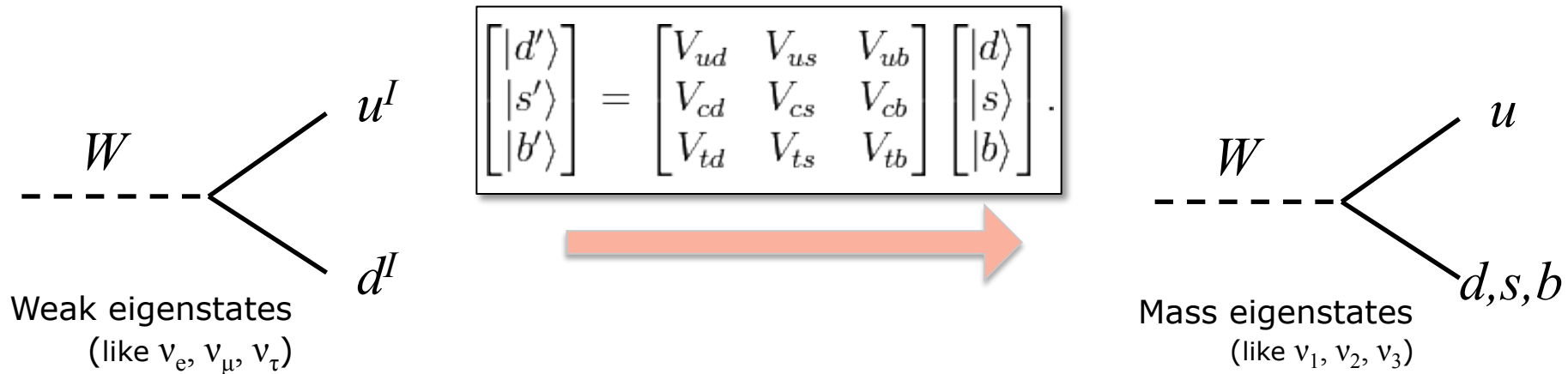
What's going on??

Yukawa Couplings



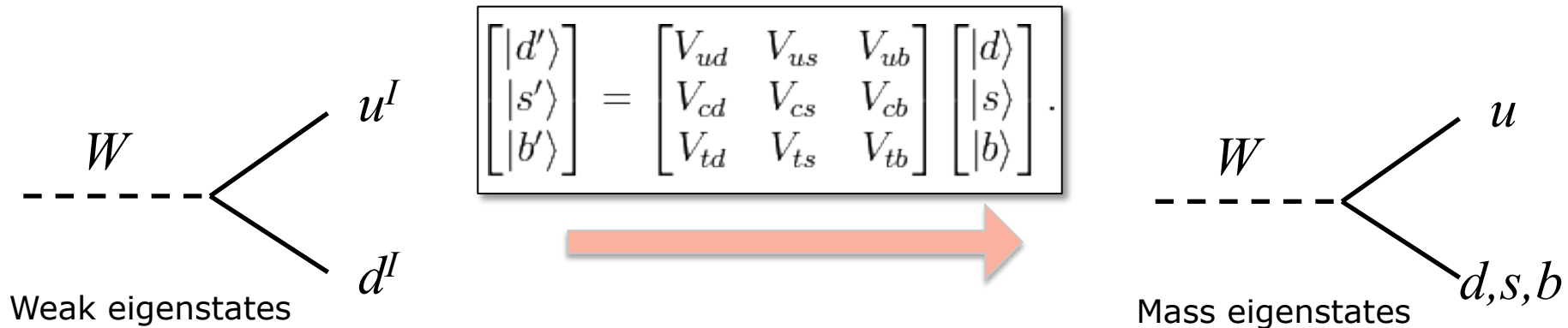
(CKM: a quick reminder...)

1) Matrix to transform weak- and mass-eigenstates:



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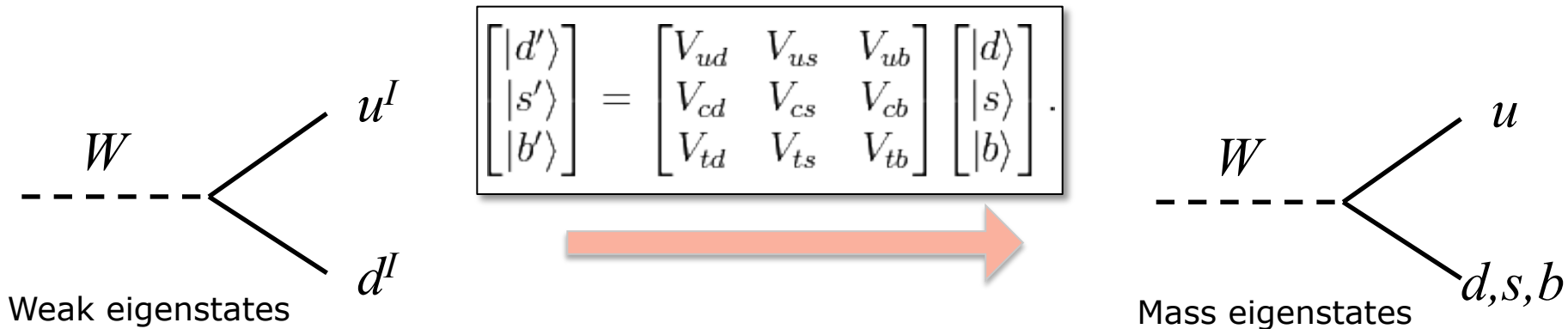


2) Matrix has imaginary numbers:

$$\begin{pmatrix} |V_{ud}| & |V_{us}| & |V_{ub}|e^{-i\gamma} \\ -|V_{cd}| & |V_{cs}| & |V_{cb}| \\ |V_{td}|e^{-i\beta} & -|V_{ts}|e^{i\beta_s} & |V_{tb}| \end{pmatrix}$$

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1) Matrix to transform weak- and mass-eigenstates:



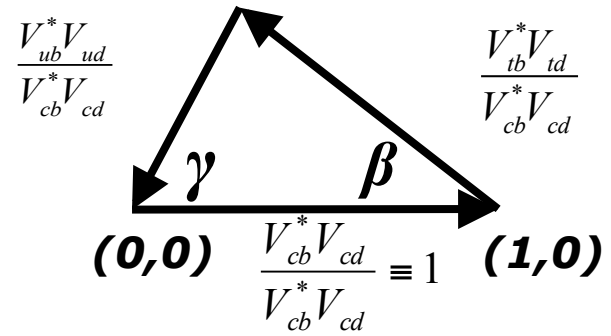
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3) Matrix is unitary:

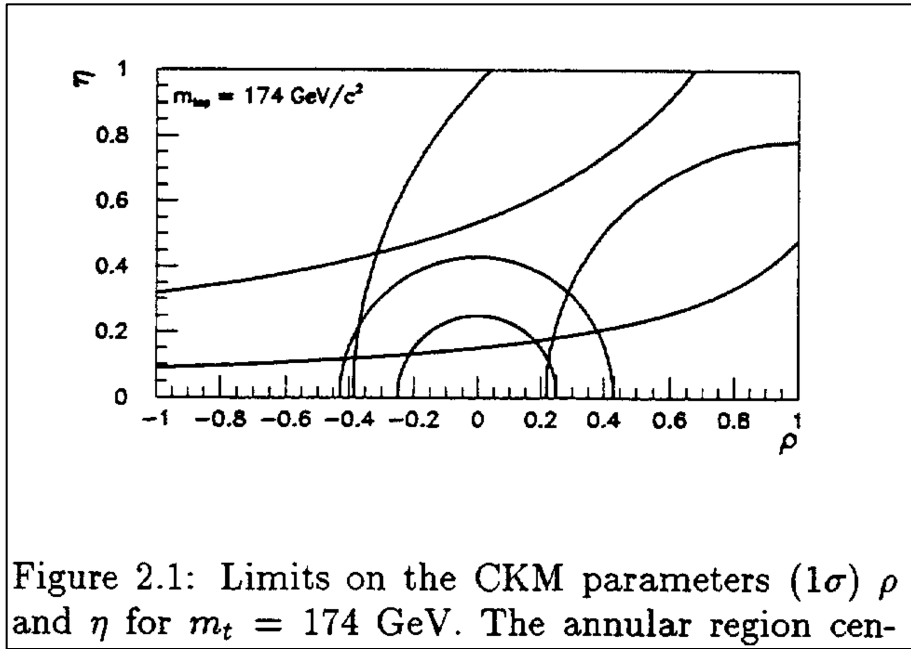
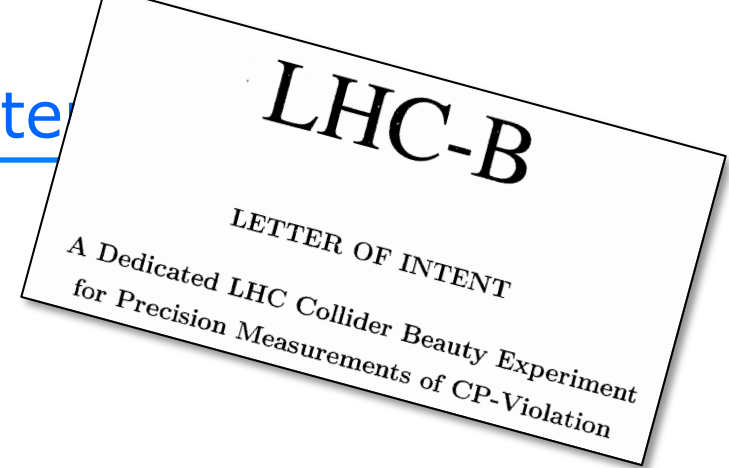
$$V^+V = \begin{pmatrix} V_{ud}^* & V_{cd}^* & V_{td}^* \\ V_{us}^* & V_{cs}^* & V_{ts}^* \\ V_{ub}^* & V_{cb}^* & V_{tb}^* \end{pmatrix} \begin{pmatrix} V_{ud} & V_{us} & V_{ub} \\ V_{cd} & V_{cs} & V_{cb} \\ V_{td} & V_{ts} & V_{tb} \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$V_{ub}^*V_{ud} + V_{cb}^*V_{cd} + V_{tb}^*V_{td} = 0$$



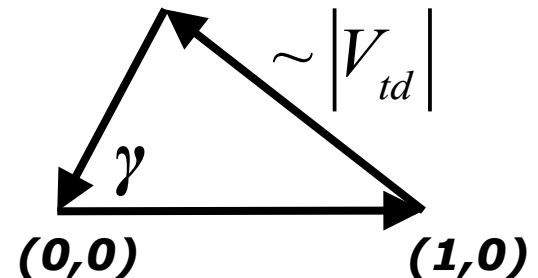
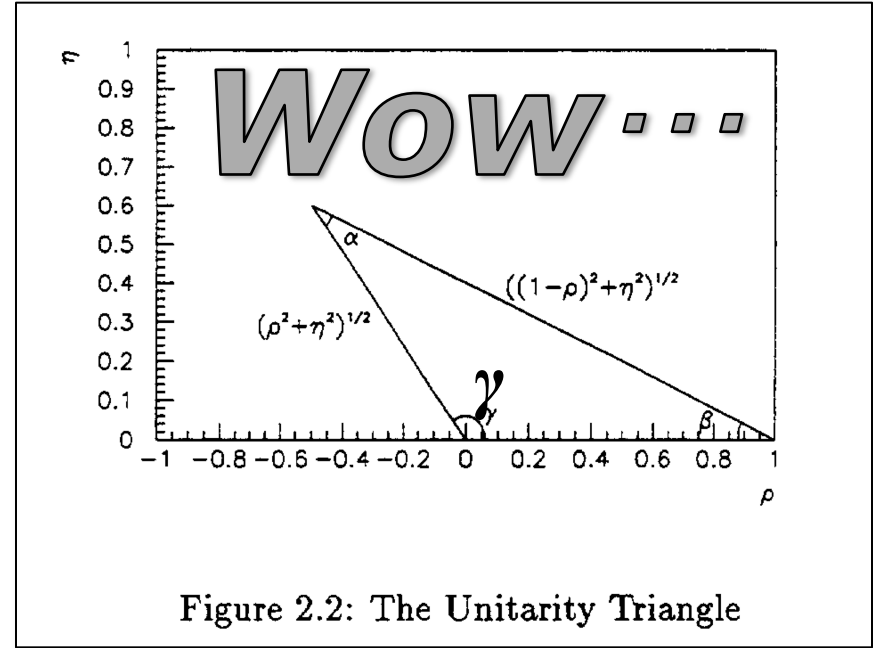
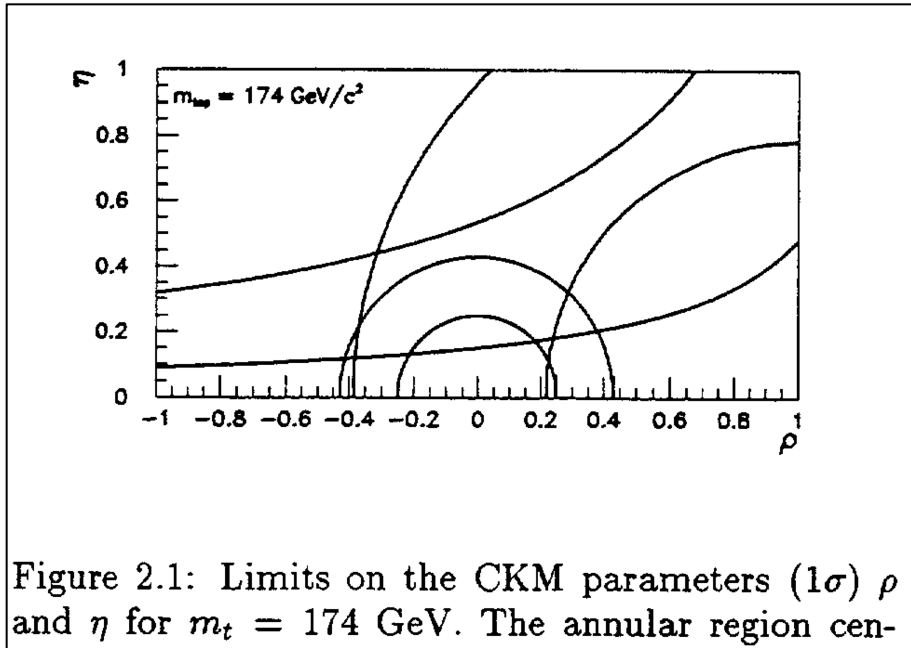
CKM: (1995) LHCb Letter-of-Intent

- LHC-B Letter-of-Intent 1995



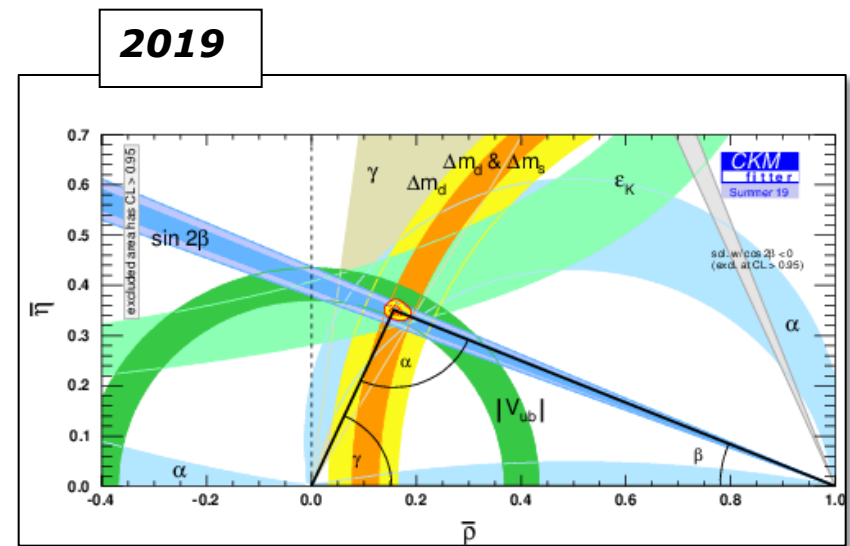
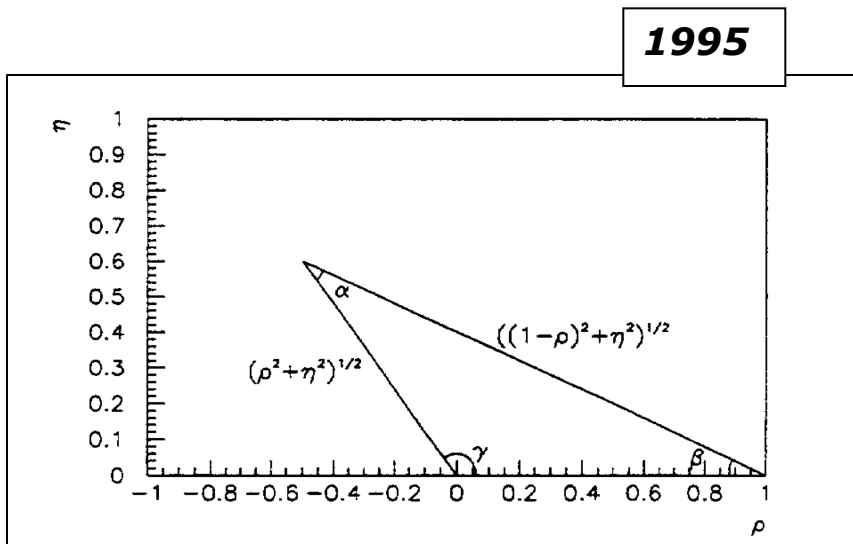
CKM: (1995) LHCb Letter-of-Intent ...

- Letter-of-Intent 1995



CKM

- All consistent?



Outline

- Once upon a time...
- Working Groups
 - Physics Analysis WG
 - Physics Performance WG
 - Liaisons
- Structure
- Review
- Deadlines

Organisation: LHCb

- Collaboration Board

- Management

- OPG, TB, PPG

– ...

» ...

Structure

Collaboration Board

Important decisions are made by the Collaboration Board, in which each collaborating institute has one representative.
[Collaboration Board Members](#)

Click [here](#) for the previous Collaboration Board meetings

Collaboration Board Chair: Val Gibson	
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LHCb Management

Spokesperson: Chris Parkes	
Deputy Spokesperson: Matteo Palutan	
Technical Coordinator: Rolf Lindner	
Deputy Technical Coordinator & GLIMOS: Eric Thomas	
Resources Coordinator: Carmelo D'Ambrosio	

Operation Planning Group	Technical Board	Physics Planning Group									
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Operations Coordinator</td> <td style="width: 30%; padding: 5px;">Silvia Gambetta</td> <td style="width: 40%; text-align: center; padding: 5px;"></td> </tr> </table>	Operations Coordinator	Silvia Gambetta		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Technical Board Chair</td> <td style="width: 30%; padding: 5px;">Rolf Lindner</td> <td style="width: 40%; text-align: center; padding: 5px;"></td> </tr> </table>	Technical Board Chair	Rolf Lindner		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Physics Coordinator</td> <td style="width: 30%; padding: 5px;">Niels Tuning</td> <td style="width: 40%; text-align: center; padding: 5px;"></td> </tr> </table>	Physics Coordinator	Niels Tuning	
Operations Coordinator	Silvia Gambetta										
Technical Board Chair	Rolf Lindner										
Physics Coordinator	Niels Tuning										
Deputy Operations Coordinator: Francesco Polci		Deputy Physics Coordinator: Marco Pappagallo									
Spokesperson: Chris Parkes	Spokesperson: Chris Parkes	Spokesperson: Chris Parkes									
Deputy Spokesperson: Matteo Palutan	Deputy Spokesperson: Matteo Palutan	Deputy Spokesperson: Matteo Palutan									
Commissioning Coordinator: Federico Alessio	Resource Coordinator: Carmelo D'Ambrosio	CB Chair: Val Gibson									
Physics Coordinator: Niels Tuning	Deputy TL & LEXGLIMOS: Eric Thomas	RTA: Vladimir Gligorov									
LHC Radiation & Safety Coordinator: Gloria Corti	Operation Coordinator: Silvia Gambetta	Computing PL: Concezio Bozzi									
Technical Coordinator: Rolf Lindner	Electronics Coordinators: Ken Wyllie	Operations Coordinator: Silvia Gambetta									
Online: Niko Neufeld	Physics Coordinator: Niels Tuning	EB Chair: Franz Muheim									

Organisation: Physics

- Working Groups

LHCb Physics Organisation

The LHCb Physics Coordinator for 2020 and 2021 is [Niels Tuning](#) with deputy [Marco Pappagallo](#) and should be contacted using [lhcb-physi](#)

The physics output of LHCb is discussed by the Physics Planning Group (PPG), which is chaired by the Physics Coordinator. The member Physics Coordinator. The membership outlined in the image below was ratified by the Collaboration Board on [27 September 2011](#) (see a

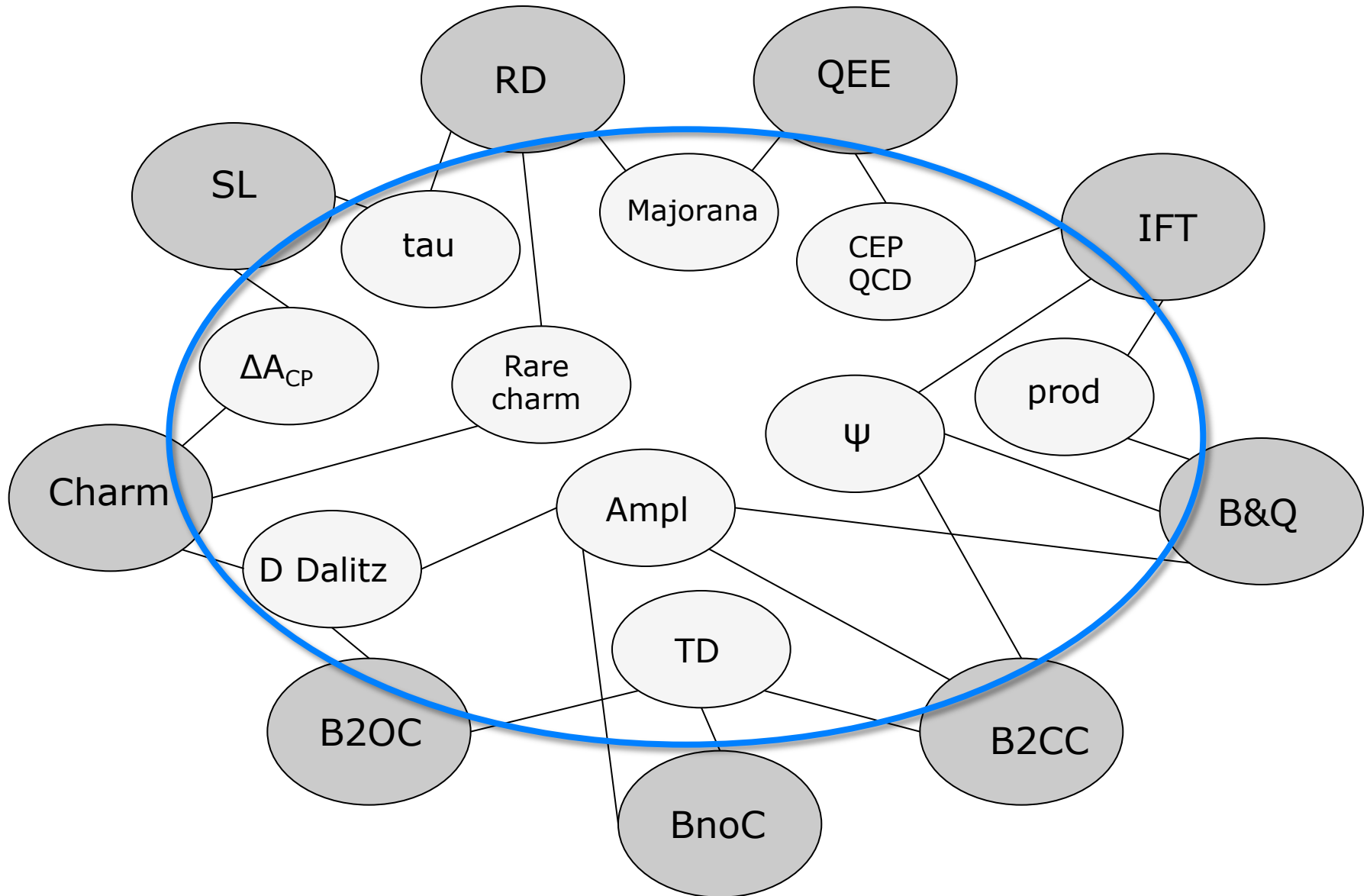
More details of the roles of some of the positions represented in the PPG can be found on the [LHCbPhysicsOrganisation](#) Twiki page. Conta

The current (*) conveners of the Working Groups are given in the table below. More details on the physics topics covered by each Working

Physics Analysis Working Groups	
QCD, Electroweak and Exotica	Olli Lupton, Carlos Vazquez Sierra
B hadrons and Quarkonia	Ivan Polyakov, Jibo He
Charm physics	Mark Williams, Michael Morello
Rare decays	Flavio Archilli, Paula Alvarez Cartelle
B decays to Charmonia	Sevda Esen, Diego Martinez Santos
B decays to Open Charm	Agnieszka Dziurda, Nathan Jurik
Charmless b-hadron decays	Jeremy Dalseno, Roberta Cardinale
Semileptonic decays	Michel De Cian, Marcello Rotondo
Ions and Fixed Target	Yanxi Zhang, Benjamin Audurier
Physics Performance Working Groups	
Run1-2 performance (covering Tracking , Particle identification and CALO Objects)	Michael Alexander, Vitalii Lisovskyi
Flavour tagging	Daniel O'Hanlon, Veronika Georgieva Chobanova
Luminosity	Pasquale Di Nezza, Vladik Balagura
Simulation Group	Michal Kreps, Dominik Mueller, Adam Davis
Other groups and fora	
Stripping	Nicole Skidmore, Alison Tully
Statistics	Hans Dembinski, Matthew Kenzie
Amplitude Analysis	Jonas Rademacker, Biplab Dey
Early Measurements Task Force (Run3)	Eva Gersabeck

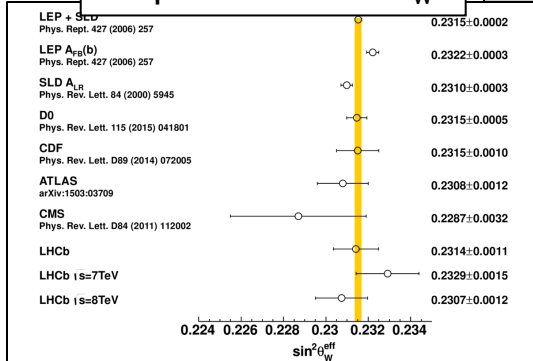
(*) Last updated 31 Jan, 2020.

Physics Analysis WG Landscape: lots of overlap

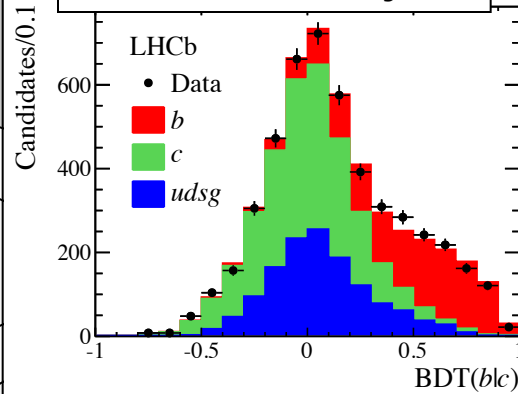


Physics Analysis WG Landscape: more than b!

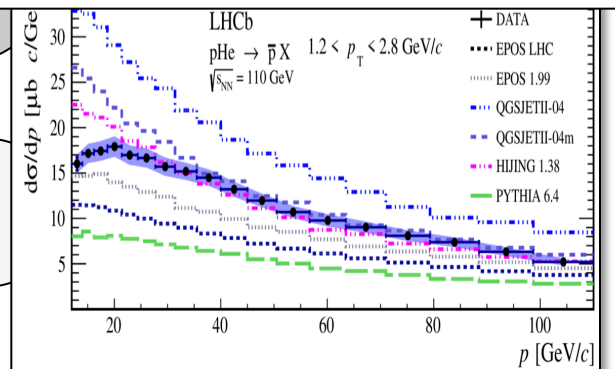
Impressive $\sin^2\theta_W$



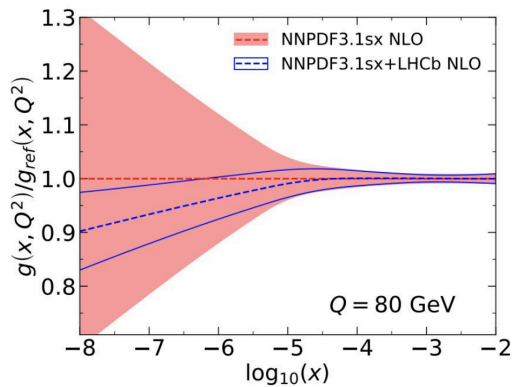
Resolve b and c jets



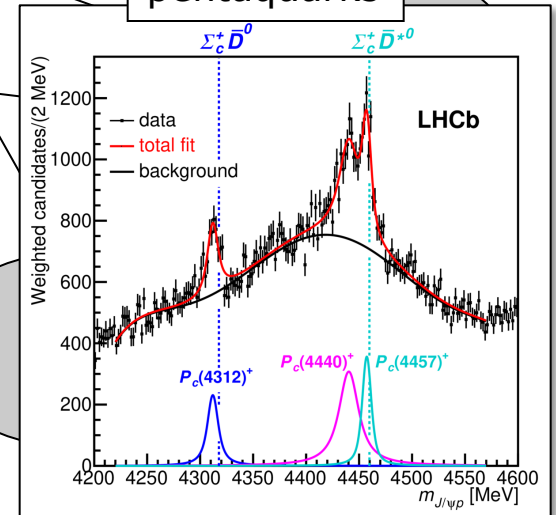
Anti-proton flux for cosmic rays



Improve proton pdf's

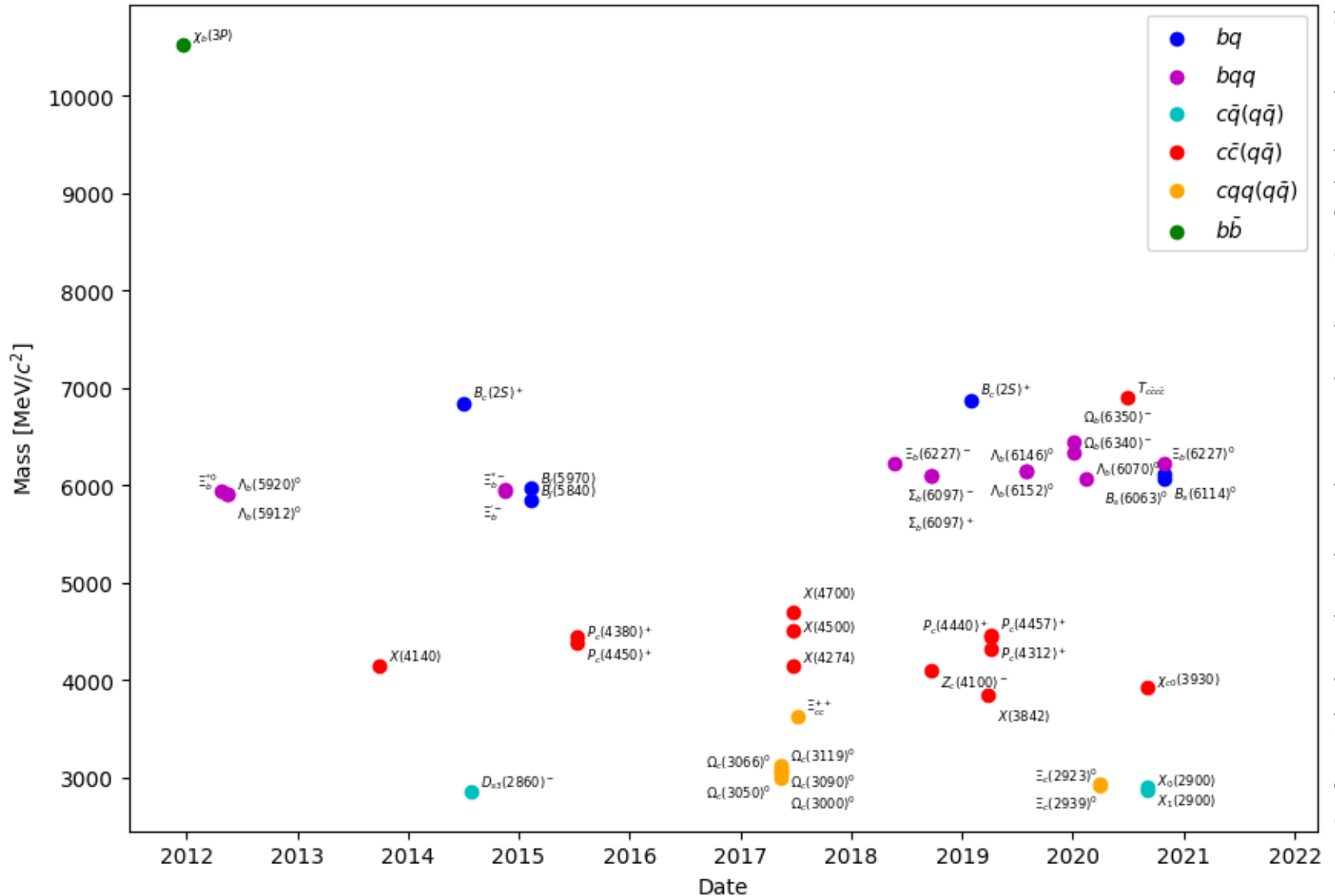


Discovery of pentaquarks



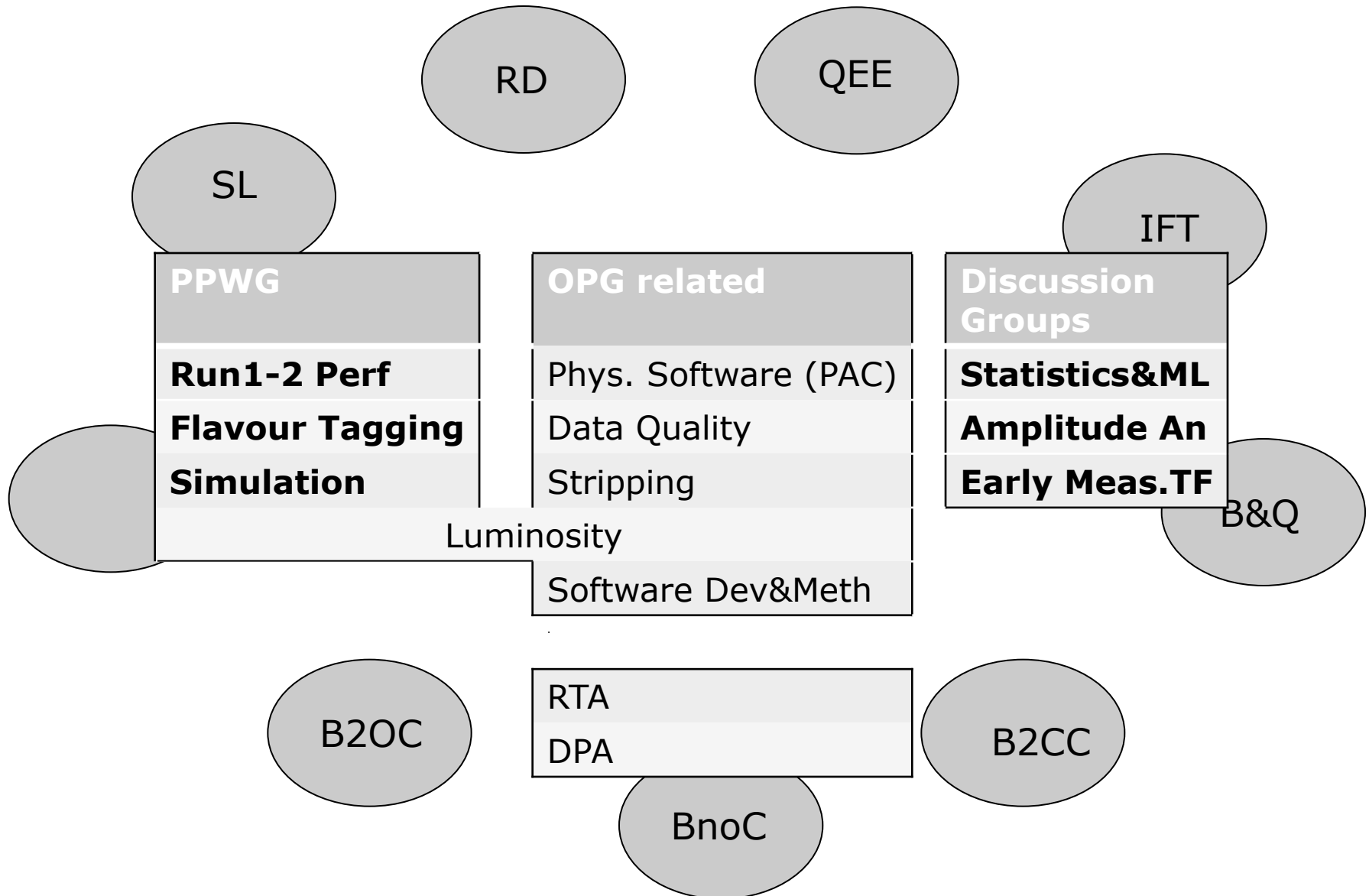
A.Garcia, R.Gauld,
A.Heijboer, J.Rojo
arXiv:2004.04756

New hadrons discovered...

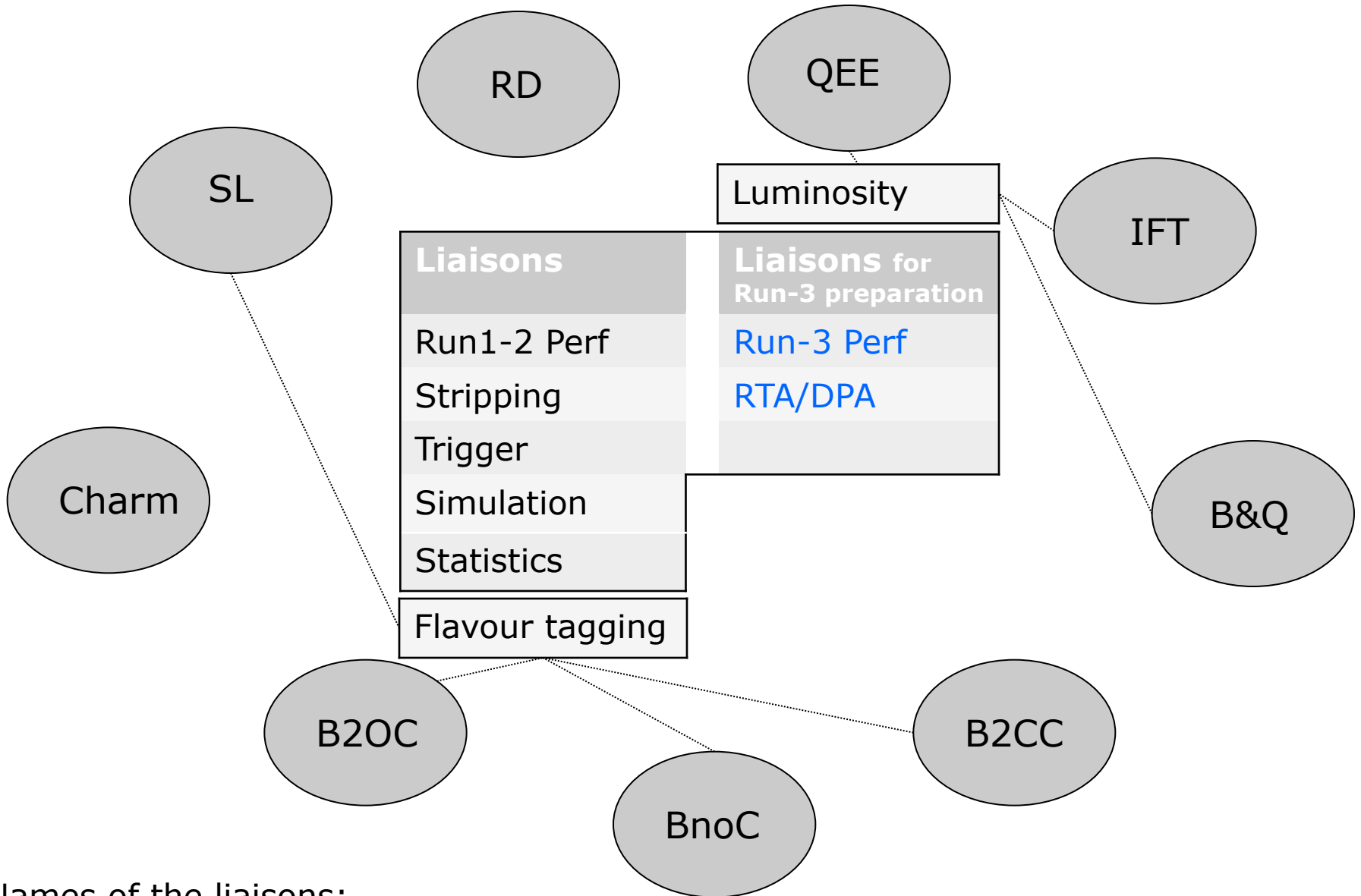


So far 47 hadrons have been discovered at the LHC, of which 41 by LHCb

Physics Performance WGs



Liaisons



Names of the liaisons:

<https://twiki.cern.ch/twiki/bin/view/LHCbPhysics/LHCbWGLiaisons>

Preparing for run-3: Liaisons

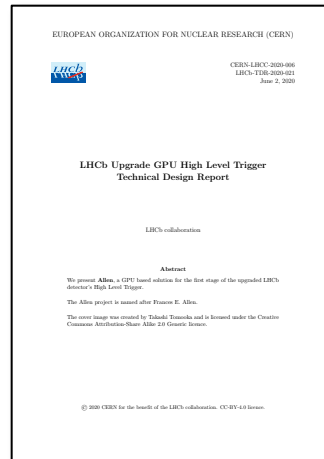
- Liaisons to contribute to run-3
 - 1) RTA/DPA (help implementations, relevant to WG)
 - 2) RTA/EMTF (run-3 performance, ensure variables relevant to WG are monitored)

MC	EMTF	RTA	(Real Time Analysis)	DPA	(Data Processing & Analysis)
Simulation Validation	Early	WP1	Data structures		
	Physics	WP2	Reconstruction	WP1	Sprucing
	Analysis	1) WP3	Selections	WP2	Analysis productions
	Data	2) WP4	Align & Calib	WP3	Offline analysis tools
	Validation	WP5	QA	WP4	Innovative techniques
			WP6	R&D	WP5

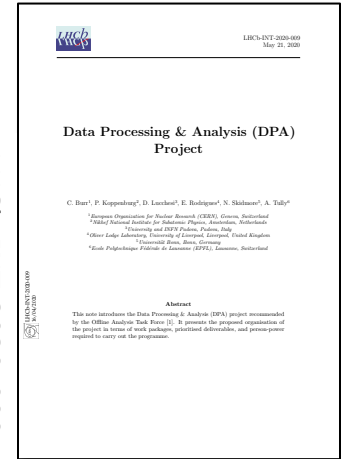
Preparing for run-3

- RTA/DPA/EMTF/Simulation structure exists
- Data validation is more important than ever

CERN-LHCC-2020-006



LHCb-INT-2020-009



MC

EMTF
Early
Physics
Analysis
& Data
Validation

RTA (Real Time Analysis)
WP1 Data structures
WP2 Reconstruction
WP3 Selections
WP4 Align & Calib
WP5 QA
WP6 R&D

DPA (Data Processing & Analysis)
WP1 Sprucing
WP2 Analysis productions
WP3 Offline analysis tools
WP4 Innovative techniques
WP5 Legacy software & data

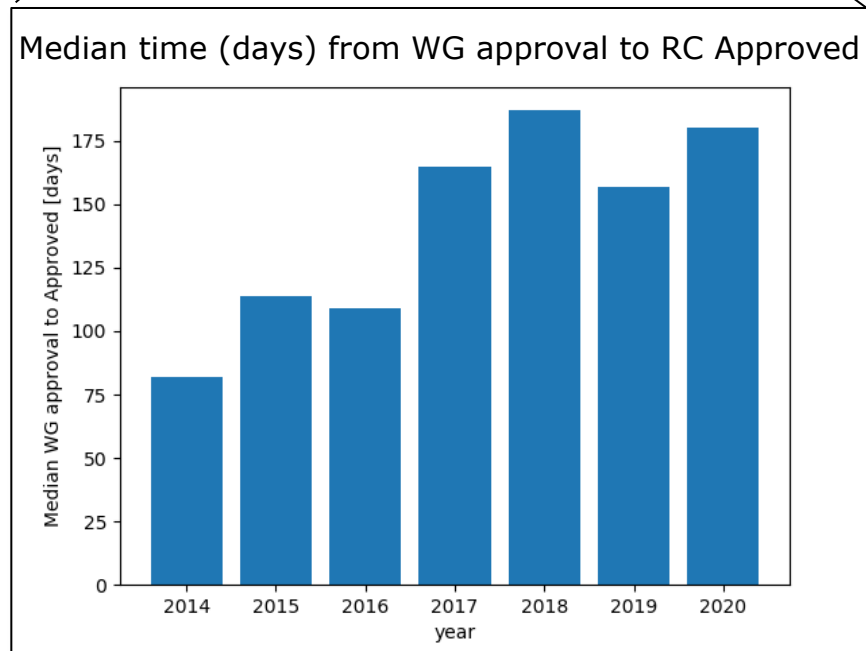
Review



- Review procedure widely appreciated by the collaboration!
 - (even though it can be lengthy at times...)

Review

- Review by RC is thorough!

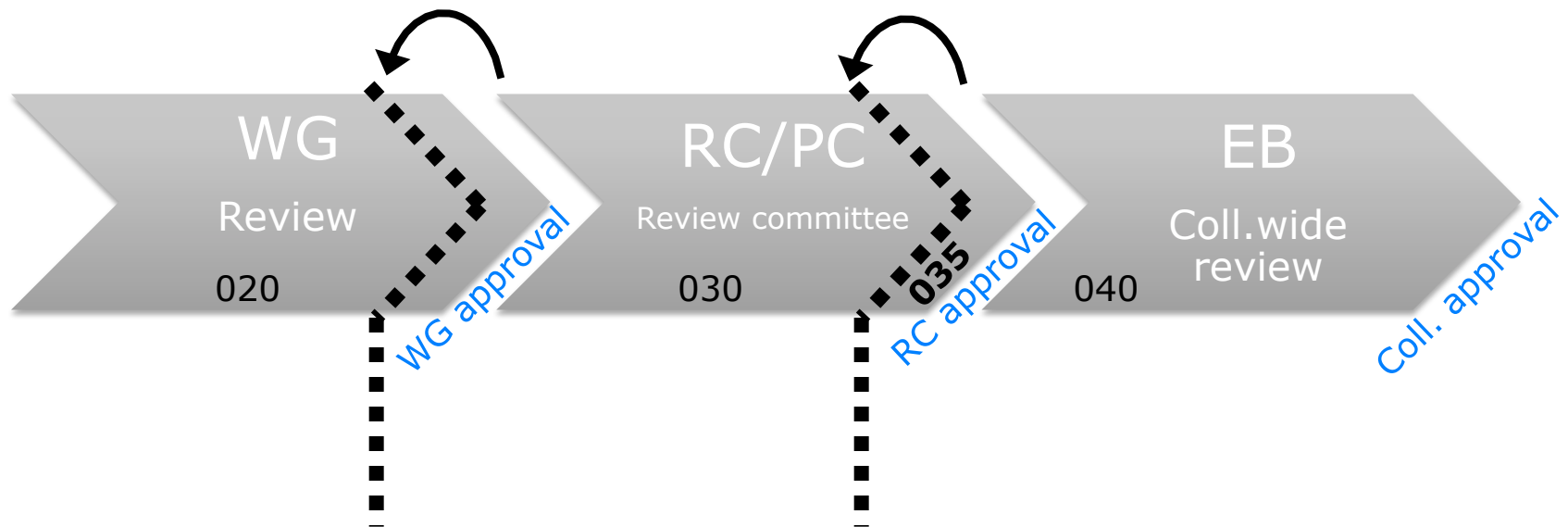


Publication statistics:

<https://lhcb-publications-stats.web.cern.ch/lhcb-publications-stats/plots.html>

Review procedure

- We try to help the process from WG to EB:
 - Assign review committee prior to WG approval
 - Assign EB reviewer prior to RC approval



- Paraphrasing EB chair Franz Muheim:
 - *"Be aware that conferences come and go, but papers are there to stay"*
 - Or: Quality is leading, Milestones are subleading

Analysis status

- Can be followed from webpages:

020-RC requested
030-Under review
040-Waiting 1st draft
050-1st collaboration review
060-Waiting 2nd draft
070-EB reading
080-Waiting 3rd draft
090-2nd collaboration review
100-Waiting for submission
110-Submitted to journal
120-Approved by journal
130-Done
140-Retired

Analyses belonging to B2OC

Status	ID	Contacts	Title	Details
020-RC requested	B2OC-Omegab2XicKpi-001	Mikhail Mikhasenko , Sara Mitchell , Marco Pappagallo	Exclusive observation of excited Ω_c^0 baryons in the Ω_b^- decays and test of spin hypotheses	more
020-RC requested	B2OC-Dms-Run2-001	Alessandro Bertolin , Agnieszka Dziurda , Kevin Heinicke , Michele Veronesi	Precision measurement of the $B_s^0 - \bar{B}_s^0$ oscillation frequency with the $B_s^0 \rightarrow D_s^- \pi^+$ decays	more
020-RC requested	B2OC-Bd2DstDsst-001	Donal Hill , Malcolm John	Angular analysis of $B^0 \rightarrow D^{*-} D_s^{*+}$ decays using Run 2 data	more
030-Under review	B2OC-Bu2DstDspiAmAn-001	Anton Poluektov , Raul Rabadan	Amplitude Analysis of $B^+ \rightarrow D^{*-} (2010) D_s^+ \pi^+$	more
030-Under review	B2OC-ADSwitD2hhpi0-run2-001	Colm Murphy , Malcolm John , Donal Hill	GLW and ADS analysis of $B^\pm \rightarrow D(hh\pi^0)h^\pm$	more
050-1st collaboration review	PAPER-2020-037	Philipp Ibis , Antje Moedden , Margarete Schellenberg	Observation of the decay $B_s^0 \rightarrow D^{*\pm} D^\mp$ and measurement of its branching fraction	more
050-1st collaboration review	PAPER-2020-036	Donal Hill , Malcolm John	Measurement of CP observables in $B^\pm \rightarrow D^{(*)} K^\pm$ and $B^\pm \rightarrow D^{(*)} \pi^\pm$ decays using two-body D final states	more
050-1st collaboration review	CONF-2020-003	Matt Kenzie , Mark Whitehead	Update of the LHCb combination of the CKM angle γ	more
070-EB reading	PAPER-2020-034	Chen Chen , Liming Zhang , Tim Gershon	Observation of a new excited D_s^+ state in $B^0 \rightarrow D^+ D^- K^+ \pi^-$ decays	more
070-EB reading	PAPER-2020-030	Phillipe d'Argent , Eva Gersabeck , Matthieu Kecke	Measurement of the CKM angle γ using $B_s \rightarrow D_s^\pm K^\mp \pi^\pm \pi^\pm$ decays	more
090-2nd collaboration review	PAPER-2020-021	Jordy Butter , Sevda Esen , Niels Tuning	Measurement of the branching fraction of the $B^0 \rightarrow D_s^+ \pi^-$ decay	more
100-Waiting for submission	PAPER-2020-019	Mikkel Bjorn , Sneha Malde	Measurement of the CKM angle γ in $B^\pm \rightarrow DK^\pm$ and $B^\pm \rightarrow D\pi^\pm$ decays with $D \rightarrow K_S^0 h^+ h^-$	more
110-Submitted to journal	PAPER-2020-025	Daniel Johnson , Tim Gershon , Mike Williams	Amplitude analysis of the $B^+ \rightarrow D^+ D^- K^+$ decay	more
110-Submitted to journal	PAPER-2020-024	Daniel Johnson , Tim Gershon , Mike Williams	A model-independent study of resonant structure in $B^+ \rightarrow D^+ D^- K^+$ decays	more
110-Submitted to journal	PAPER-2020-006	Pavol Stefko , Daniel Johnson , Fred Blanc , Tatsuya Nakada	Measurement of the branching fractions for $B^+ \rightarrow D^{*+} D^- K^+$, $B^+ \rightarrow D^{*-} D^+ K^+$, and $B^0 \rightarrow D^{*-} D^0 K^+$ decays	more

Analysis status

Status	050-1st collaboration review
Paper	PAPER-2020-041
Title	Angular analysis of the $B^+ \rightarrow K^{*+} \mu^+ \mu^-$ decay
Can be shown in Conference?	Yes (as of 28 Oct 2020)
Working group	RD
Contacts	Martino Borsato , Michel De Cian , David Gerick
Referee chair	Mitesh Patel
Referee(s)	Mikhail Mikhasenko
EB reviewer	John Walsh
EB readers	Sergey Barsuk , Jolanta Brodzicka
Institutes	Barcelona, Spain , ITEP, Moscow, Russia , Bologna, Italy , Zurich, Switzerland , Dublin, Ireland , Ferrara, Italy ,
Review e-group	lhcb-review-RD-Bu2KstarMuMuAngular (archives)
Paper e-group	lhcb-paper-2020-041-reviewers (archives)
EP number	
ANA-number	ANA-2018-022
Twiki	https://twiki.cern.ch/twiki/bin/viewauth/LHCbPhysics/Bu2KstarMuMuAngularAnalysis
Authors	LHCb
arXiv	
Journal	PRL
Dataset	2011, 2012, 2015, 2016, 2017, 2018
Analysis gitlab	https://gitlab.cern.ch/LHCb-RD/ewp-Bplus2Kstmumu-AngAna
Tuples location	/eos/lhcb/wg/RD/Bu2Kstmumu
WG approval	22-Jan-2020
EB reviewer assigned	25-Sep-2020
Perminssion to go to paper/conf	13-Oct-2020
1st collaboration-wide review	28-Oct-2020 https://cds.cern.ch/record/2741581
2nd collaboration-wide review	
Final EB reading	
Collaboration approval	
Submitted	
Accepted	
Published	

Deadlines?

- Implications Workshop just ended

Conference	WG sign-off (typical)	WG sign-off (last possible)	Assign EB reviewer	Approval presentation for PAPER	Latest date for PAPER 1st circulation	Approval presentation for CONF	Latest date for CONF circulation	Practice talks	Start of conference
		030	035 (NEW, tbd)	040	050				
Autumn 2020 conferences									
Implications (virtual confirmed)	7 Jun 2020	7 Sep 2020	w/c 21 Sep 2020	w/c 5 Oct 2020	12 Oct 2020	w/c 12 Oct 2020	19 Oct 2020	w/c 19 Oct 2020	28 Oct 2020
CKM (cancelled)									30 Nov 2020
Winter 2021 conferences									
Initial Stages (IFT)	3 Aug 2020	2 Nov 2020	w/c 16 Nov 2020	w/c 30 Nov 2020	3 Dec 2020	w/c 7 Dec 2020	11 Dec 2020	w/c 4 Jan 2021	10 Jan 2021
La Thuile	15 Oct 2020	15 Jan 2021	w/c 1 Feb 2021	w/c 15 Feb 2021	19 Feb 2021	w/c 22 Feb 2021	26 Feb 2021	w/c 1 Mar 2021	8 Mar 2021
Moriond	29 Oct 2020	29 Jan 2021	w/c 15 Feb 2021	w/c 1 Mar 2021	4 Mar 2021	w/c 8 Mar 2021	10 Mar 2021	w/c 15 Mar 2021	20 Mar 2021
Summer 2021 conferences									
Quark Matter	17 May 2021	16 Aug 2021	w/c 30 Aug 2021	w/c 13 Sep 2021	16 Sep 2021	w/c 20 Sep 2021	22 Sep 2021	w/c 27 Sep 2021	3 Oct 2021



<https://twiki.cern.ch/twiki/bin/viewauth/LHCbPhysics/UpcomingDeadlines>

Large effort by LHCb colleagues to provide fresh input last week!

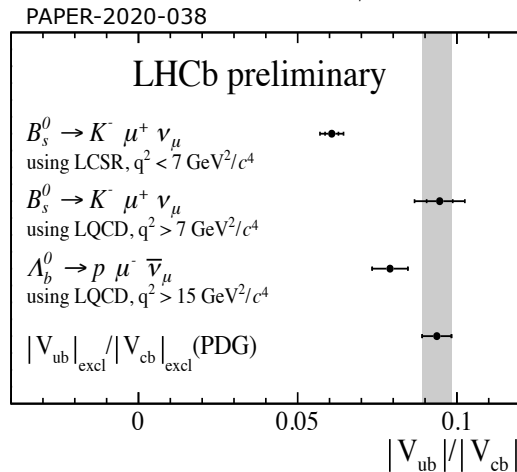
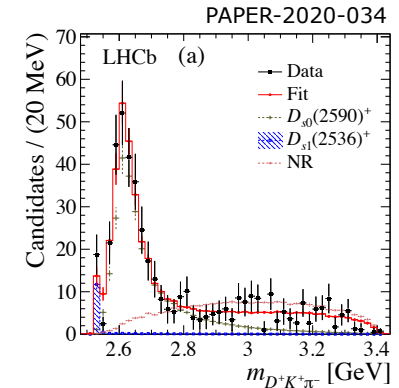
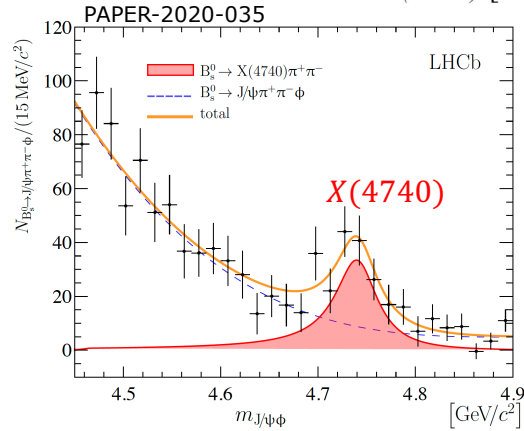
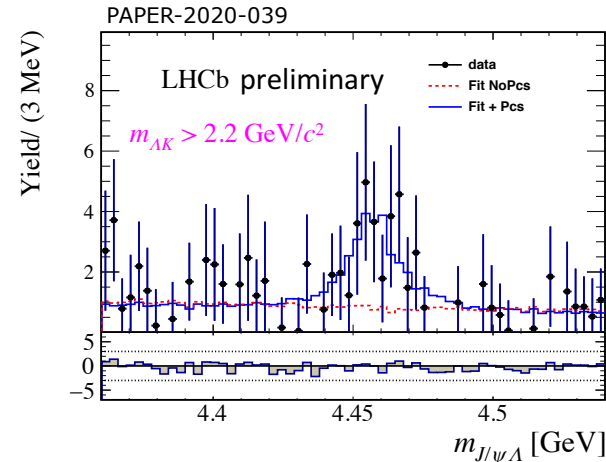
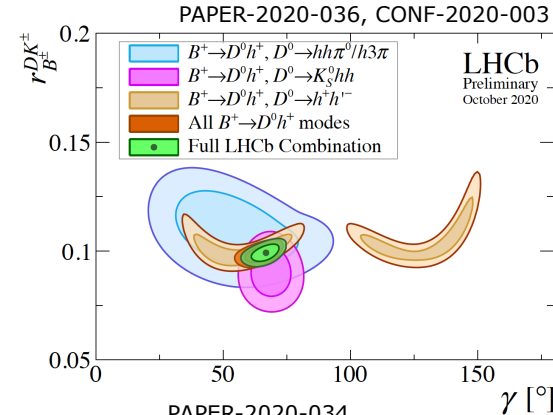
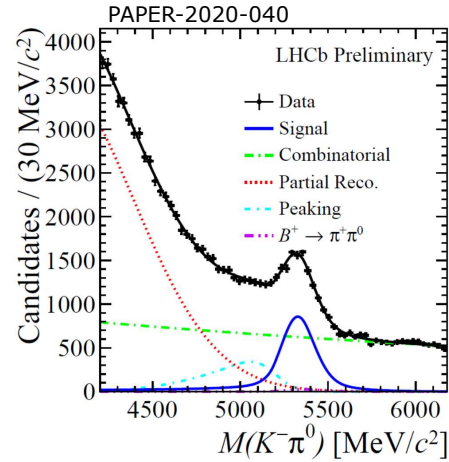
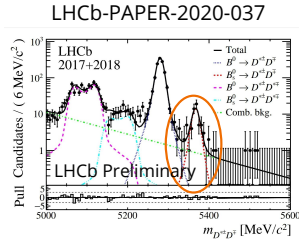
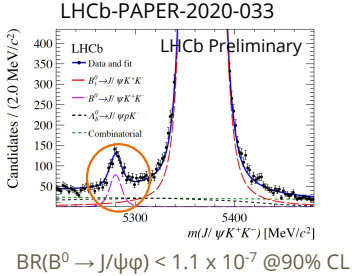
- 10 new LHCb results presented last week for the first time:

Report	Title	What?
PAPER-2020-027	Search for long-lived particles decaying to $e\mu\nu$	Exotic
PAPER-2020-035	Study of $B_s^0 \rightarrow J/\psi K^+ K^- \pi^+ \pi^-$	X(4740)
PAPER-2020-033	Search for the rare decay $B^0 \rightarrow J/\psi \varphi$	OZI
PAPER-2020-034	Observation of a new excited D_s^+ state in $B^0 \rightarrow D^+ D^- K^+ \pi^-$ decays	$D_{sJ}^+(2590)$
PAPER-2020-037	Observation of the $B_s^0 \rightarrow D^{*\pm} D^\mp$ decay and measurement of its branching fraction	Penguin
PAPER-2020-038	Measurement of the ratios $B(B_s \rightarrow K\mu\nu)/B(B_s \rightarrow D_s\mu\nu)$ and $ V_{ub} / V_{cb} $	$ V_{ub} $
PAPER-2020-036	Measurement of CP observables in $B^\pm \rightarrow D^{(*)} K^\pm$ and $B^\pm \rightarrow D^{(*)} \pi^\pm$ decays	γ
CONF-2020-003	Update of the LHCb gamma combination	γ
PAPER-2020-040	Measurement of direct CP violation in the decay $B^+ \rightarrow K^+ \pi^0$	Kn puzzle
PAPER-2020-039	Evidence of a $J/\psi \Lambda$ resonance and observation of excited Ξ^{*-} states in $\Xi_b^- \rightarrow J/\psi \Lambda K^-$	$P_{cs}^0(4459)$
PAPER-2020-041	Angular analysis of the decay $B^+ \rightarrow K^{*+} \mu^+ \mu^-$	P_5'

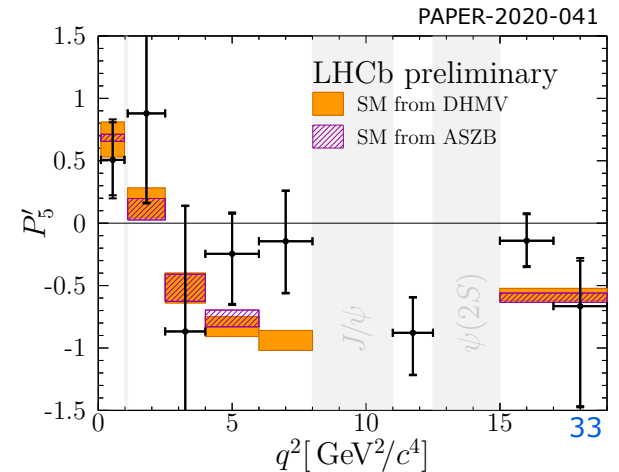


	Wed 28 Oct	Thu 29 Oct	Fri 30 Oct
Morning	Opening PAPER-2020-033 PAPER-2020-037 IFT	Spectroscopy PAPER-2020-035 PAPER-2020-034 PAPER-2020-039	Rare Decays PAPER-2020-041
Afternoon	CPV + mixing PAPER-2020-036 CONF-2020-003 PAPER-2020-040	Semileptonics PAPER-2020-038	QEE PAPER-2020-027 Closing

Large effort by analysts and reviewers!



PAPER-2020-027



Deadlines?

- We start to worry ~now about Moriond...

Conference	WG sign-off (typical)	WG sign-off (last possible)	Assign EB reviewer	Approval presentation for PAPER	Latest date for PAPER 1st circulation	Approval presentation for CONF	Latest date for CONF circulation	Practice talks	Start of conference
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<https://twiki.cern.ch/twiki/bin/viewauth/LHCbPhysics/UpcomingDeadlines>

“Moriond” ?

This was not a conference or a school, but a gathering (“rencontre”) of minds. The name of what became a series of meetings reflects this original motivation. Held in Moriond village, the very first of the Rencontres de Moriond was a resounding success. (1965)

The 20 participants included theorists and experimenters of all ages, from France, Italy (Frascati) and Germany (DESY).

The time was well filled with fruitful but relaxed discussions, culinary experiments, skiing, and evenings spent listening to music performed by the scientists themselves.

Gradually, the Rencontres de Moriond became known as the annual fair of the high-energy physics community.

<https://cerncourier.com/a/40-great-years-of-the-rencontres-de-moriond/>

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(“gathering of minds” ?)

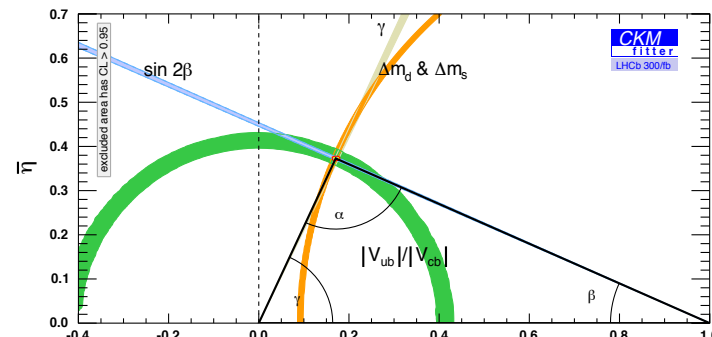
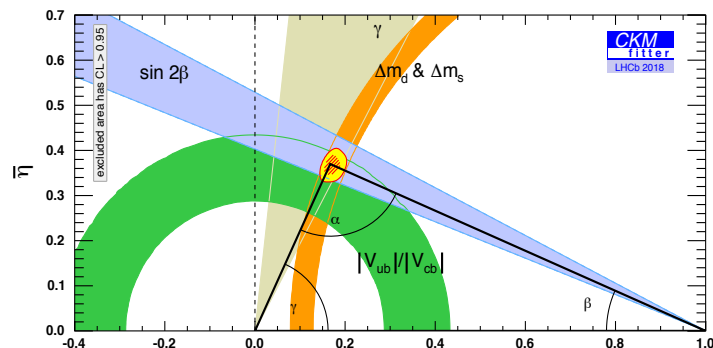
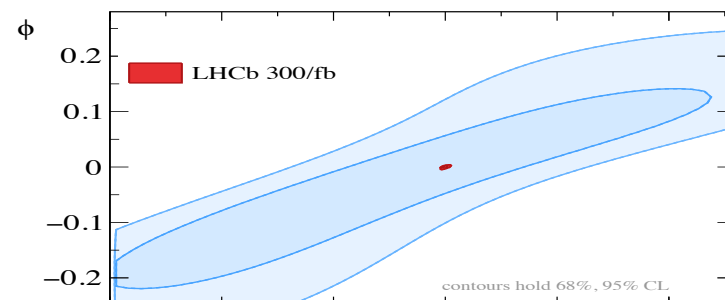
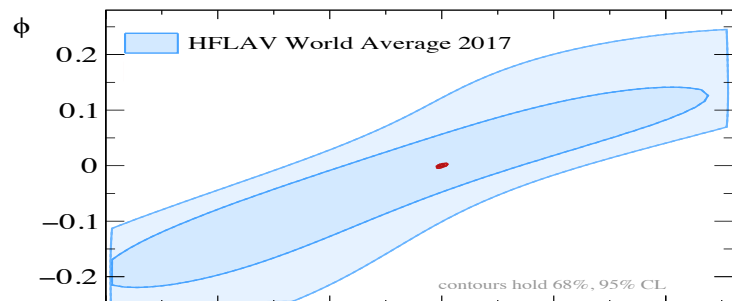
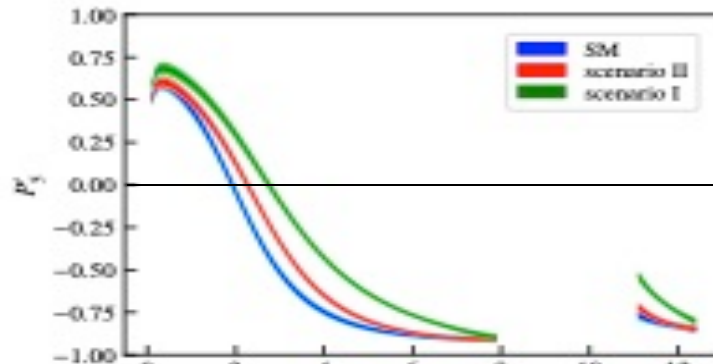
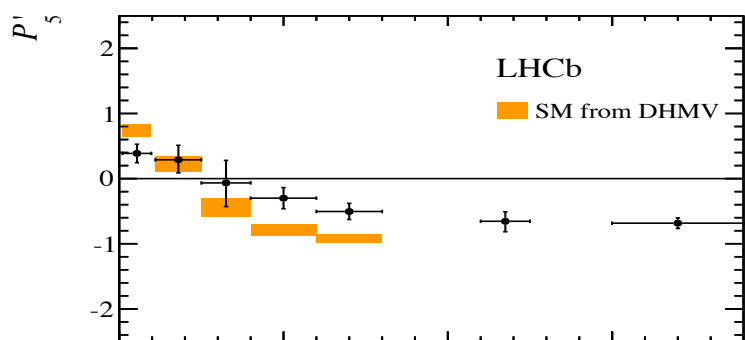
(20 ?!)

(culinary??)

<https://cerncourier.com/a/40-great-years-of-the-rencontres-de-moriond/>

Summary

- Precision measurements to scrutinize the Standard Model
- Precision measurements only way to reach very high mass scales
- Precision measurements are not yet precise enough



Rare Decays

Charm

Beauty

Thanks!

Some links

- Twiki
 - <https://twiki.cern.ch/twiki/bin/viewauth/LHCbPhysics/LHCbPhysics>
 - <https://twiki.cern.ch/twiki/bin/view/LHCbPhysics/LHCbPhysicsAnalysisTopicsByWorkingGroup>
- Constitution
 - <https://twiki.cern.ch/twiki/bin/view/LHCbPhysics/LHCbPhysicsOrganisation>
- Analysis database
 - <http://lhcb-wg.web.cern.ch/lhcb-WG/>
- EB status
 - <https://lhcb-publications-stats.web.cern.ch/lhcb-publications-stats/active.html>
- Upcoming conference deadlines
 - <https://twiki.cern.ch/twiki/bin/view/LHCbPhysics/UpcomingDeadlines>
- Publication rules
 - https://lhcb.web.cern.ch/lhcb_page/collaboration/organization/editorial_board/PublicationProcedureNovember2011.pdf
- Guidelines for high-profile analyses
 - https://indico.cern.ch/event/715188/contributions/2948291/attachments/1623378/2584231/Guidelines_high_impact_analyses_FINAL.pdf