

Fragmentation free Vcb at LHCb and FCC-ee



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The contents here are very preliminary, not finalized but super exiting!



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Preface

Interesting physics should continue no matter how long it takes

We do not know our future but young theorists are free to do whatever we want
and motivate future experiments



宇宙の始まり 加速器で再現へ
欧州が戦略改定、日本誘致に逆風

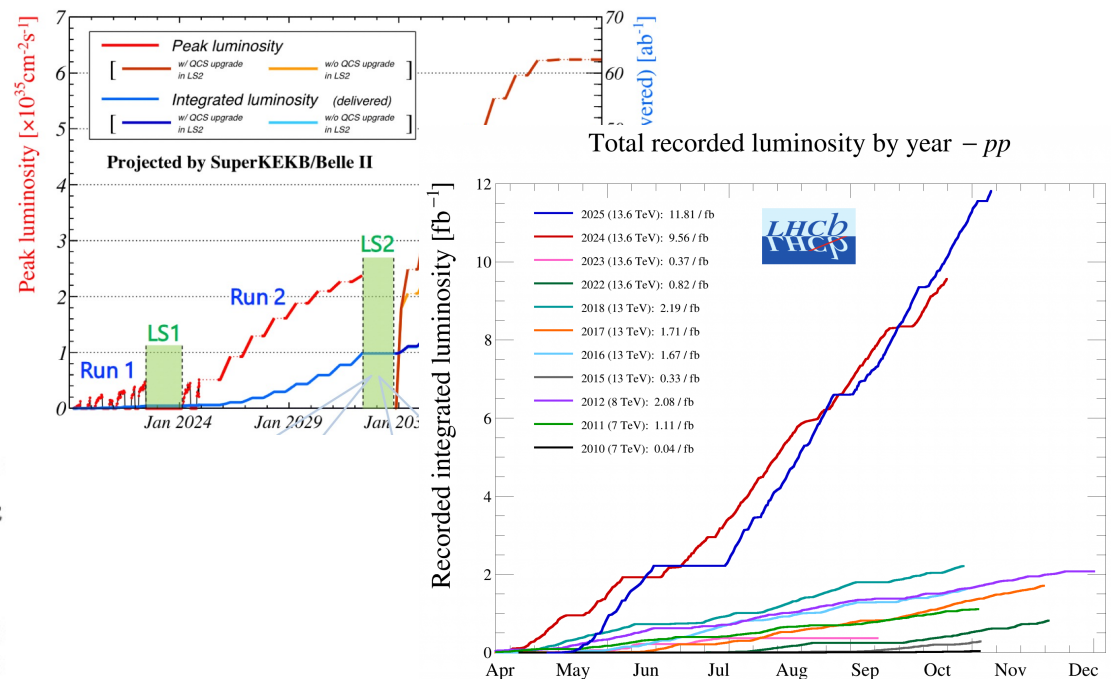
2026年5月31日 2:00 [会員限定記事]

保存



素粒子物理学の実験施設である円形加速器を新たに整備する研究戦略を欧州合同原子核研究機関（CERN）がまとめた。周長約90キロメートルの施設で宇宙や物理学の謎に迫る壮大な計画だが、巨額の建設費など実現に向けた課題も多い。

CERNは22日、欧州素粒子物理戦略を6年ぶりに改定した。新たな柱となるのは新型加速器「FCC-ee」の建設だ。フランスとスイスの国境付近の地下約200メートルにトンネルを掘り、...



My interview comment on [news paper](#)

Interesting time ahead!

Motivation

V_{cb} appears everywhere in precision flavor physics thorough V_t s also.

$|V_{cb}|$ Tension

Andrzej J . Buras

$$|V_{cb}|_{\text{inclusive}} = (41.97 \pm 0.48) \cdot 10^{-3} \quad \text{Finauri \& Gambino (2310.20234)}$$

$$|V_{cb}|_{\text{exclusive}} = (39.21 \pm 0.62) \cdot 10^{-3} \quad \text{(FLAG (2022))} \quad \text{8\% puzzle}$$

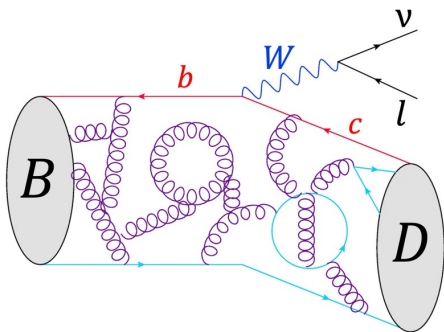
(see also Bordone, Gubernari, van Dyk, Jung (1912.09335)
Bordone, Capdevilla, Gambino (2107.00604)

Note: Changing $|V_{cb}|$: $39 \cdot 10^{-3} \Rightarrow 42 \cdot 10^{-3}$
 changes $|V_{cb}|^2$: by 16% ($B_{s,d} \rightarrow \mu^+ \mu^-$, $\Delta M_{s,d}$)
 $|V_{cb}|^3$: by 25% ($K^+ \rightarrow \pi^+ \nu \bar{\nu}, \epsilon_K$)
 $|V_{cb}|^4$: by 35% ($K_L \rightarrow \pi^0 \nu \bar{\nu}, K_S \rightarrow \mu^+ \mu^-$)



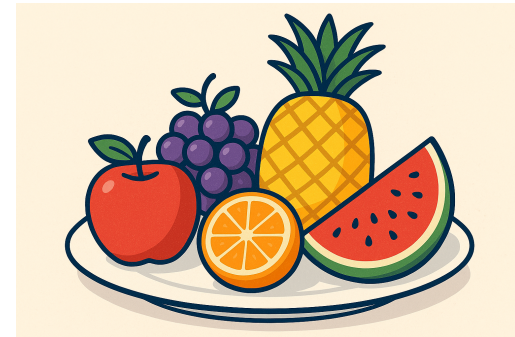
Recent Vcb determination

see talk by WR



Ingredients

- Lattice(non-zero recoil)
- LCSR
- QCDSR
- Unitarity bound
- Distribution data (w , $\cos\theta_l$, $\cos\theta_\nu$, χ)
-



Fit scenario	$ V_{cb} $ fit result ($\times 10^3$)						2606.17138
	BSZ		BGL		HQET		
	$N_F = 1$	$N_F = 2$	$N_F = 1$	$N_F = 2$	(2/1/0)	(3/2/1)	
(B) + combined	39.2 ± 0.4	39.5 ± 0.5	40.0 ± 0.4	39.5 ± 0.5	38.3 ± 0.6	38.3 ± 0.7	

Consistent with the previous Vcb exclusive

So we need another method to determine Vcb

Slides can be shared upon a reasonable request

Sorry the following slides include
very exciting but preliminary results, future directions, private communications
therefore I can not upload them here.

Please contact Syuhei if you are interested in!