

RF1: Weak decays of b and c quarks

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Snowmass Day, September 24, 2021

Status

- We had two workshops before the Snowmass pause:
 - Sept 28-29, 2020 “Lepton flavor violation and lepton universality violation in meson and baryon decays” (with RF5) <https://indico.fnal.gov/event/44442/>
 - Jan 11-12, 2021 “Theory meets experiment on $|V_{ub}|$ and $|V_{cb}|$ ” (with TF05 and TF06), <https://indico.fnal.gov/event/46246/>
- We had paused all activities from mid-January 2021 to mid-September 2021
- We now want to focus on organizing whitepapers and planning the RF1 report

LOIs received

USQCD	Numerical Lattice Gauge Theory
T. S. M. Ho et al.	Testing Lepton Flavor Universality at Z pole
Y. Duan et al.	Searching for $B_s \rightarrow \phi \nu \nu$ and other $b \rightarrow s \nu \nu$ processes
Fermilab Lattice, MILC, TUMQCD	Lattice-QCD Determinations of Quark Masses and the Strong Coupling α_s
LBNF	Precision Measurements with (Anti)Neutrinos at LBNF
F. Bernlochner et al.	Future analyses of semileptonic decays with Hammer
T. Zheng and M. Ruan	Exploring new physics with $B_c \rightarrow \tau \nu \tau$
S. Roy, R. Sinha, N. Deshpande	CP-violation study in b-baryon hadronic decays using SU(3) symmetry
Fermilab Lattice, MILC	Precision Lattice QCD in Support of BSM Searches
RBC and UKQCD	LOI for RF1: Weak decays of b and c quarks
B. Dey et al.	High precision determinations of $ V_{xb} $ from a close theory-experiment collaboration
J. V. Bennett, A. Datta et al.	CP Asymmetry Measurements with Charmed Baryons
D. Mitzel et al.	LOI on Rare Charm Decays
A. Lenz et al.	High Precision SM Predictions for Quark Flavor Observables
Belle II	B Physics at Belle II
Belle II	Charm Physics at Belle II
HFLAV	Decays of Heavy Flavors Beauty, Charm, and Tau
B. Bhattacharya and A. Datta	Triple-Product Asymmetries
R. Bause et al.	Lepton universality and lepton flavor conservation tests with dineutrino modes
BINP SCTF	Precision experiments at Super Charm-Tau Factory
F. Dettori et al.	Novel EFT connections between K and B physics
N. Chanon et al.	CPT-Symmetry Studies Involving Quarks
F. Martinez Vidal, N. Neri	Direct measurement of short-lived particle dipole moments at the LHC
A. Datta et al.	Light Mediators and Flavor Anomalies
STCF	Physics Potential of a Super tau-Charm Facility
A. Lytle	Precision theory inputs for $ V_{cb} $ and LFUV observables
T. DeGrand, W. Jay et al.	Lattice-QCD studies of inclusive B-meson decays
W. Altmannshofer	Rare b Decays as Probes of New Physics
LHCb	Letter of Interest from the US LHCb Group

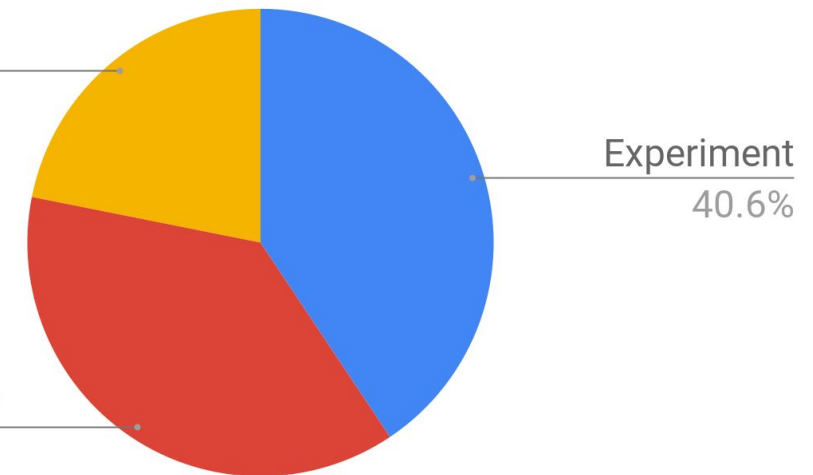
LOIs received

- Some common themes:
 - Research in heavy flavor physics is an essential component of particle physics
 - Anomalies, semileptonic b decays and charm physics among the most discussed topics
 - Importance of precise form factors for semileptonic decays, new methods for inclusive decays on the lattice
- We expect many of these to become contributed papers. Please get in touch with us to let us know your plans

29 LOIs split by area

Lattice QCD
21.9%

Phenomenology
37.5%



Overview whitepapers

- We want to solicit four whitepapers to give an overview of the physics discovery potential and questions that can be addressed (from both theory and experiments point of views) in the following main areas:
 1. High precision in CKM unitarity tests
 2. Other sources of CP violation (charm, baryons, etc)
 3. Lepton-flavor violation and lepton-flavor universality
 4. Rare decays
- We plan to appoint editors (one theorist, one experimentalist) in the next few weeks and organize a meeting to coordinate the effort. If you are interested in becoming an editor, please contact us