

## Studies of the CKM matrix with semileptonic decays

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Exclusive semileptonic b-hadron decays are under good theoretical control, which allows precise determinations of the CKM matrix elements,  $V_{ub}$  and  $V_{cb}$ . The large production of  $\Lambda_b$  baryons and  $B_s$  mesons at the LHC allows LHCb to provide complementary information with respect to the B-factories in this sector, as well as in the measurement of the shape of the  $\Lambda_b$  differential decay rates. An alternative approach for measuring  $V_{ub}$ , less affected by theoretical uncertainties, is through fully leptonic decay modes. Also this approach is explored at LHCb with the search for the  $B \rightarrow 3\mu$  decay. At the same time, novel experimental techniques are used to measure the fraction of semileptonic  $B^+$  to charm meson decays, in order to improve the understanding of the inclusive charm semileptonic rate and the background description for analyses exploiting exclusive  $b \rightarrow c$  and  $b \rightarrow u$  transitions. The latest LHCb results on CKM matrix element determination and related measurements and searches are presented.

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