

CP averaged and CP violating observables for $B \rightarrow K^* \ell^+ \ell^-$ in the full kinematic region

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We present a complete and comprehensive analysis of the $B \rightarrow K^* (\rightarrow K\pi) \ell^+ \ell^-$ decay, focusing on clean CP-averaged and CP-violating observables both at large and low hadronic recoil. For that purpose we define a complete set of clean CP-asymmetries (P_i^{CP}) related to the clean observables P_i . We present predictions within the Standard Model for all the relevant observables

of interest, integrated over the appropriate bins including lepton mass corrections. We identify an optimal basis of observables that combines theoretical and experimental advantages, which will guide the New Physics searches in flavor in the short term.

We discuss some New Physics opportunities of the observables in the basis, which exhibit

a better sensitivity to New Physics than other observables. Finally, we present first bounds on the S-wave contribution to the distribution coming from the $B \rightarrow K^*_0 \ell^+ \ell^-$ decay, which must be held under control in order to interpret correctly the data.

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