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Search for the Decay $B^+ \to K^+ \nu\bar{\nu}$

Liu Kai

Key points today

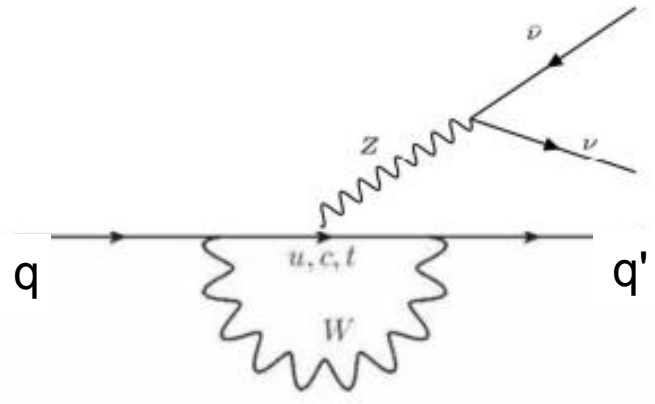
- Physics picture of FCNC process to neutrino pair
- how to detect events with two undetected neutrinos in e+e- collision

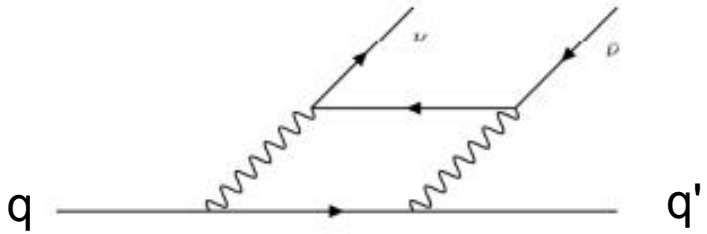
Physics in SM

For the FCNC decays with lepton pairs(Dalitz decay), the long-distance contribution is large.

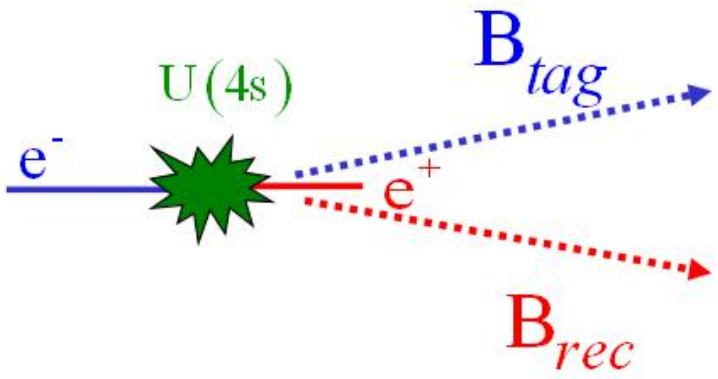
Decays of $H \to H'\nu\bar{\nu}$ is dominated by the short-distance contribution.

- theoretical uncertainties much smaller
- highly suppressed in Standard Model(SM)





Tag technique



Eextra

related background photons. The total calorimeter energy attributed to the signal decay, $E_{\rm extra}$, is computed by summing all EMC clusters that are not associated either with the decay daughters of the B^- or with the signal track. Signal events are required to have $E_{\rm extra} < 250$ MeV. The

we could borrow this idea in our analysis

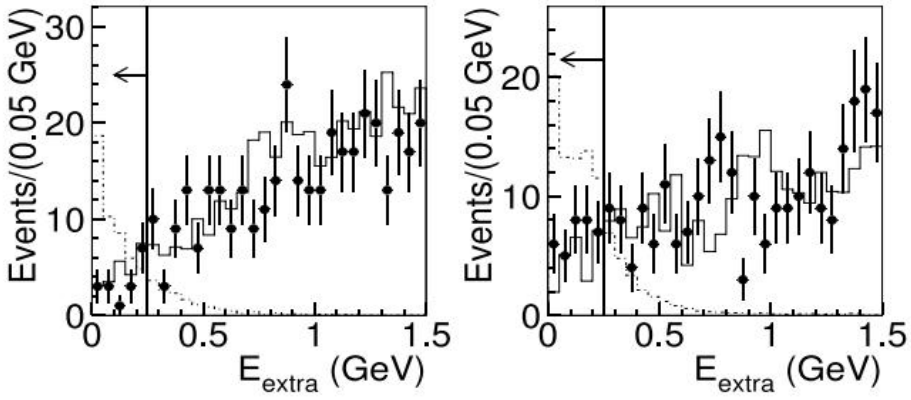


FIG. 2. The $E_{\rm extra}$ distribution for $B^+ \to K^+ \nu\bar{\nu}$ $B^-_{\rm had}$ (left) and $B^-_{\rm sl}$ (right) events. Events are required to have a reconstructed B^- and exactly one additional track which has been identified as a kaon. No other signal-selection cuts have been applied. The data and background MC samples are represented by the points with error bars and solid histograms, respectively. The dotted line indicates the expected $B^+ \to K^+ \nu\bar{\nu}$ signal distribution from MC simulation.

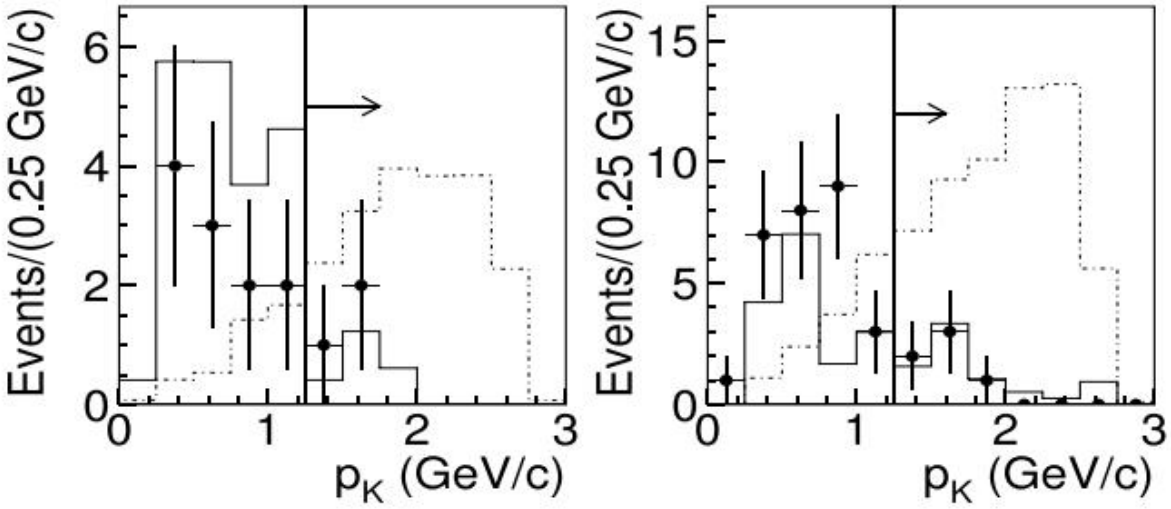


FIG. 3. The p_K distribution for (a) $B^-_{\rm had}$ and (b) $B^-_{\rm sl}$ events after applying the full $B^+ \to K^+ \nu\bar{\nu}$ selection except for the $p_K > 1.25$ GeV$/c$ requirement. The dotted line indicates the expected signal distribution from MC simulation. The data are represented by the points. The expected background distributions obtained from MC simulation are also plotted (solid histograms) although it should be noted that estimates of nonpeaking backgrounds are obtained directly from data and hence differ slightly from the MC estimates shown here.