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## Studies of missing energy decays of B meson at Belle II

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The Belle II experiment at the SuperKEKB collider is a major upgrade of the KEK “B factory” facility in Tsukuba, Japan. The machine is designed for an instantaneous luminosity of  $8 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$ , and the experiment is expected to accumulate a data sample of about  $50 \text{ ab}^{-1}$  in five years of running. With this amount of data, decays sensitive to physics beyond the Standard Model can be studied with unprecedented precision. One promising set of modes are physics processes with missing energy such as  $B^+ \rightarrow \tau^+ \nu$ ,  $B \rightarrow D^*(\tau \nu)$ , and  $B \rightarrow K^*(\nu \bar{\nu})$  decays.

The  $B \rightarrow K^*(\nu \bar{\nu})$  decay provides one of the cleanest experimental probes of the flavour-changing neutral current process  $b \rightarrow s \nu \bar{\nu}$ , which is sensitive to physics beyond the Standard Model. However, the missing energies of the two neutrinos in the final state makes the measurement challenging and requires full reconstruction of the spectator B meson in  $e^+ e^- \rightarrow \text{Upsilon}(4S) \rightarrow B \bar{B}$  events. Observation of the  $B \rightarrow K^*(\nu \bar{\nu})$  decay will become possible with the large data set to be collected by the upgraded Belle II experiment running at the Super-KEKB accelerator in Japan. A challenge of this analysis will be understanding and suppressing backgrounds. This talk discusses such backgrounds and the expected sensitivity of Belle II for this rare decay.

### Experimental Collaboration

Belle II

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