

The High Level Trigger for Rare Decays at LHCb

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Present constraints on physics beyond the Standard Model are heavily influenced by measurements of rare processes where observables are theoretically well controlled. Rare B decays will offer opportunities to make further world class constraints on new physics at the LHC, and a host of such decays will be studied at the LHCb experiment.

Given the small $b\bar{b}$ cross-section expected and the very rare decays in question, the trigger is a critical aspect of isolating such decays in the LHC experimental environment. At LHCb the trigger will consist of a first level hardware trigger, based on searching for high transverse energy objects, and a second 'High Level Trigger' based on software algorithms running on a CPU-farm. Developing suitable algorithms for the latter, and understanding their operation, will be one of the central challenges in delivering the first physics measurements. In this paper, the trigger strategy for several of the most promising measurements will be outlined. In addition to isolating suitable signal samples, many measurements will require control channels to establish efficiencies and to provide calibration samples for various effects. The plans for acquiring such ancillary samples will also be detailed. We will also discuss how we will deal with biases introduced in the angular acceptance for the $B_d \rightarrow K^0 \mu^+ \mu^-$ decay and lifetime biases in the $B_s \rightarrow \phi \gamma$ decay.

We will summarise with the expected effects of the trigger on our statistical and systematic errors.

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