

## Journées de Rencontre Jeunes Chercheurs 2023



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# $B_{d(s)}^0 \rightarrow K_S^0 hh'$ branching fraction measurement at LHCb, first time integrated amplitude analysis of $B_s^0 \rightarrow K_S^0 \pi^+ \pi^-$ and feasibility study of $B_d^0 \rightarrow K^{*0} \tau^+ \tau^-$ at FCC- $ee$ .

lundi 23 octobre 2023 11:00 (30 minutes)

The first part of the presentation is focused on a current LHCb analysis about the measurement of the branching fraction of the  $B_{d(s)}^0 \rightarrow K_S^0 hh'$  modes, where  $h$  and  $h'$  could denote a pion or a kaon, by using the LHCb Run1 and Run2 data. The first goal of the analysis is to measure the  $B_d^0 \rightarrow K_S^0 K^+ K^-$  decay mode unobserved to date. The second goal of the study is to update the measurement of the known branching fractions with the full Run 1 + Run 2 dataset and improved analysis techniques.

The second part of the presentation is focused on the upcoming amplitude analysis within LHCb, that follows the branching fraction measurement of  $B_{d(s)}^0 \rightarrow K_S^0 hh'$ . The first time-integrated Dalitz plot analysis of the decay  $B_s^0 \rightarrow K_S^0 \pi^+ \pi^-$  will be performed in order to reveal direct CP asymmetries.

The third part of the presentation is focused on the study of the capabilities of the Future Circular Collider (FCC)  $ee$  phase to study the electroweak penguin transitions  $b \rightarrow s \tau^+ \tau^-$  unobserved to date. At meson scale the decay  $B_d^0 \rightarrow K^{*0} \tau^+ \tau^-$  with the transition  $\tau \rightarrow \pi \pi \nu \tau$  is studied with a method to reconstruct explicitly the two undetected neutrinos. The detector requirements to study this decay are evaluated, in particular the vertexing resolution performance are emulated and compared to IDEA one simulated detector used for FCC $ee$  simulations. Analysis of simulated signal events together with simulated dominant backgrounds has been done in order to draw the precision of the  $B_d^0 \rightarrow K^{*0} \tau^+ \tau^-$  branching fraction measurement as function of the vertexing resolution performances and evaluate the feasibility of this measurement at FCC $ee$ .

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**Classification de Session:** Standard Model

**Classification de thématique:** Standard Model