Title: Study of the rare B-meson decays with the ATLAS experiment

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Abstract: The rare $B^0_d \rightarrow K^{*0}(892)\,\mu\mu$ decay is one of the B-physics channels sensitive to Beyond Standard Model effects. The potential deviation from Standard Model predictions could be observed in the angular distribution of this decay. The work compiles several sub-tasks at the initial stage of this complex analysis: decay angles fit validation and signal event preselection. The fit functions used in the analysis are verified on generated toy Monte Carlo data. Ranges of parameters, for which are these functions positive, are established and within this parametric space, the testing of possible intrinsic fit biases is evaluated. A dependence of the fit bias with respect to the collected number of events (expected in Run 2 as well as at HL-LHC) and to the different signal-to-background ratio is studied. The second part of the thesis deals with processing of raw reconstructed data from the detector into n-tuples resulting in a more compact dataset that would be used in the final analysis. Within the process, baseline cuts are applied in order to minimize size of final datasets by reducing majority of background events. The procedure is validated on full Monte Carlo simulated data, applying final event selection taken from the Run-1 analysis.

Keywords: ATLAS, LHC, rare B-meson decays, angular analysis, maximum likelihood fit validation, event selection