

Title: Study of diffractive processes at the ATLAS Experiment  
Author: Vlastimil Kuš  
Department: Institute of Particle and Nuclear Physics  
Supervisor: Mgr. Marek Taševský, Ph.D.  
Institute of Physics of the Academy of Sciences of the CR, v.v.i.

**Abstract:** A data sample of  $pp$  collisions corresponding to an integrated luminosity of  $6.75 \text{ nb}^{-1}$  was collected at  $\sqrt{s} = 7 \text{ TeV}$  using the ATLAS detector at the Large Hadron Collider. Collision events with at least two jets with  $p_T > 20 \text{ GeV}$  are used to measure the differential cross section of the diffractive dijet production as a function of the rapidity gap size  $\Delta\eta^F$ , the largest forward region extending from  $|\eta| = 4.8$  devoid of particle activity above threshold momentum cuts, and an estimator of the fractional momentum loss of the scattered proton assuming the single diffractive dissociation ( $pp \rightarrow pX$ ),  $\tilde{\xi}^\pm$ . Comparisons with various Monte Carlo models reveal that though the region of small  $\tilde{\xi}^\pm$  and large rapidity gaps is dominated by diffraction, a contribution from non-diffractive events cannot be neglected. The rapidity gap survival probability is estimated based on data to Monte Carlo comparisons in the  $-3.2 < \log_{10} \tilde{\xi}^\pm < -2.5$  region of the  $\tilde{\xi}^\pm$  distribution with the  $\Delta\eta^F > 2$  requirement.