The main focus of this work is on the investigation of top quarks with high transverse momentum at the ATLAS experiment. In the first chapter we describe the Standard Model of Particle Physics and its components. In the second chapter we deal with top quark as the heaviest elementary particle in more detail and the end of the chapter is dedicated to top quarks with high transverse momentum and their identification. In chapter three we present kinematic variables used in hadron collisions and we describe the ATLAS detector on the LHC accelerator. The practical part of the work deals with top quarks with high transverse momentum. We investigate simulated data for the physical process of four top quarks production in a proton-proton collision at the center of mass energy of 13 TeV. Finally, an algorithm which identifies top quarks with high transverse momentum is designed and verified.