This thesis is divided into four parts. The first part is about proving that the unit ball of the Lorentz space is not an intersection body for dimension greater than or equal to 5 and $q > 2$. We go on to explain the connection with this result to the Busemann-Petty problem in convex geometry.

The second section proves separation for an inequality by V. Yaskin and M. Yaskina for polar centroid bodies. We prove separation for $p$ greater than or equal to 0 and go on to find the corresponding “hyperplane” inequalities which resemble the inequalities connected with the hyperplane conjecture for convex bodies.

The third section is about a hyperplane-type inequality involving arbitrary measures and subspaces of unconditional spaces. This is an extension of A. Koldobsky’s inequality from 2013 for unconditional bodies.

In the fourth section we find rough upper and lower bounds of volumes of central cross-sections of rectangular boxes in $n$ dimensions.