

# On the shape of a convex body with respect to its second projection body

Christos Saroglou (Texas A&M University)

## Abstract

We develop a new approach to the problem of finding sharp bounds for the affine invariant  $P(K) = V(\Pi K)/V^{d-1}(K)$ . Namely, we prove that if  $K$  is a 3-dimensional zonoid of volume 1, then its second projection body  $\Pi^2 K$  is contained in  $8K$ , while if  $K$  is any symmetric 3-dimensional convex body of volume 1, then  $\Pi^2 K$  contains  $6K$ . Both inclusions are sharp. Consequences of these results include a stronger version of a reverse isoperimetric inequality for 3-dimensional zonoids-established by the author in a previous work, a reduction for the 3-dimensional Petty conjecture to another isoperimetric problem and the best known lower bound up to date for  $P(K)$  in 3 dimensions. As byproduct of our methods, we establish an almost optimal lower bound for high-dimensional bodies of revolution.