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On a Blaschke-Santaló-type inequality for projections of (non-symmetric) convex bodies, and some applications

Consider a convex body K in $\mathbb{R}^n$ and a projection $P_F(K)$ of it to a subspace F of $\mathbb{R}^n$. If K is not origin-symmetric, then even if we 'centre' it well (that is, 'force' K to have barycentre or Santaló point at the origin), its projection may still fail to have any of these nice properties. Therefore the classical Blaschke-Santaló inequality (which upper-bounds the product of volumes of $P_F(K)$ and of its polar set within the subspace F) cannot apply directly. We will show how to derive an essentially optimal Blaschke-Santaló inequality in such settings.

This also has applications to the existence of *regular* covering ellipsoids for not-necessarily-symmetric convex bodies (a concept introduced in a celebrated theorem of Pisier, which was proved in the symmetric case).