# On non-separable families of positive homothetic convex bodies

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**Abstract**

A finite family $\mathcal{B}$ of balls with respect to an arbitrary norm in $\mathbb{R}^d$ ($d \geq 2$) is called a non-separable family if there is no hyperplane disjoint from $\bigcup \mathcal{B}$ that strictly separates some elements of $\mathcal{B}$ from all the other elements of $\mathcal{B}$ in $\mathbb{R}^d$. In this talk we prove that if $\mathcal{B}$ is a non-separable family of balls of radii $r_1, r_2, \ldots, r_n$ ($n \geq 2$) with respect to an arbitrary norm in $\mathbb{R}^d$ ($d \geq 2$), then $\bigcup \mathcal{B}$ can be covered by a ball of radius $\sum_{i=1}^{n} r_i$. This was conjectured by Erdős for the Euclidean norm and was proved for that case by A. W. Goodman and R. E. Goodman [Amer. Math. Monthly 52 (1945), 494-498]. On the other hand, in the same paper A. W. Goodman and R. E. Goodman conjectured that their theorem extends to arbitrary non-separable finite families of positive homothetic convex bodies in $\mathbb{R}^d$, $d \geq 2$. Besides giving a counterexample to their conjecture, we prove that conjecture under various additional conditions. This is a joint work with Zs. Lángi (Univ. of Tech., Budapest).