On Kakeya-Nikodym Maximal Inequalities

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In this talk, I will discuss some recent results related to the Kakeya-Nikodym problem. The main result is that for any dimension $d \geq 3$, one can obtain Wolff's $L^{(d+2)/2}$ bound on Kakeya-Nikodym maximal function in $\mathbb{R}^d$ for $d \geq 3$ without the induction on scales argument. The key ingredient is to reduce to a 2-dimensional L^2 estimate with an auxiliary maximal function. A similar argument can be applied to show that the same $L^{(d+2)/2}$ bound holds for Nikodym maximal function for any manifold (M^d, g) with constant curvature, which generalizes Sogge's results for $d = 3$ to any $d \geq 3$.