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Doubly sharp Poincaré–Sobolev inequalities on hyperbolic spaces

We study when one can subtract the full spectral gap $\left(\frac{N-1}{p}\right)^p$ of the p-Laplacian on the hyperbolic space $\mathbb{H}^N$ and still keep the sharp Euclidean Sobolev constant. Using a change of function which keeps the L^p norm, together with a one-dimensional tangent line inequality, we establish such doubly sharp inequalities with explicit remainder terms in new ranges of p, including $N = 3$ and $2 \leq p < 3$. The same method also gives sharp logarithmic Sobolev inequalities with the full spectral gap. This is joint work with A. X. Do, D. Ganguly and G. Lu.