1129-42-485 **Guozhen Lu*** (guozhen.lu@uconn.edu), Department of Mathematics, University of Connecticut, Storrs, CT 06269, and **Qiaohua Yang** (qhyang.math@gmail.com), School of Mathematical and Statistics, Wuhan University, Wuhan, Hubei , Peoples Rep of China. *Sharp Hardy-Adams inequalities on hyperbolic spaces and Hardy-Sobolev-Maz'ya inequalities for higher order derivatives on half spaces.*

We establish sharp Hardy-Adams inequalities on hyperbolic spaces $\mathbb{B}^n$ in all dimension $n \geq 4$when n is even. Our theorem in dimension four reads as follows: For any $\alpha > 0$ there exists a constant $C_\alpha > 0$ such that

$$\int_{\mathbb{B}^4} (e^{32\pi^2 u^2} - 1 - 32\pi^2 u^2) dV = 16 \int_{\mathbb{B}^4} \frac{e^{32\pi^2 u^2} - 1 - 32\pi^2 u^2}{(1-|x|^2)^4} dx \leq C_\alpha.$$

for any $u \in C_0^\infty(\mathbb{B}^4)$ with

$$\int_{\mathbb{B}^4} \left(-\Delta_{\mathbb{H}} - \frac{9}{4}\right)(-\Delta_{\mathbb{H}} + \alpha) u \cdot u dV \leq 1.$$

As applications, we obtain an much improved Adams inequality on n-dimensional hyperbolic space and an inequality which improves the classical Adams' inequality and Hardy's inequality simultaneously.

We also establish Hardy-Sobolev-Maz'ya inequalities for higher order derivatives on half spaces. The proof depends on a Hardy-Littlewood-Sobolev inequality on hyperbolic space which is of independent interest. We also give an alternative proof of Benguria, Frank and Loss concerning the sharp constant in the Hardy-Sobolev-Maz'ya inequality in the three dimensional upper half space.

The Fourier analysis on hyperbolic spaces play an important role in our proofs. (Received March 21, 2017)