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Fractional Extension/Trace Inequalities via Caffarelli-Silvestre Extension

Let $u(x,t)$ be the Caffarelli-Silvestre extension of a smooth function $f(x)$ from $\mathbb{R}^n$ to $\mathbb{R}^{n+1}_+ := \mathbb{R}^n \times (0,\infty)$. We characterize nonnegative measures μ on $\mathbb{R}^{n+1}_+$ such that $f(x) \longrightarrow u(x,t)$ induces bounded embeddings from $L^p(\mathbb{R}^n)$ to $L^q(\mathbb{R}^{n+1}_+;\mu)$ or from $\dot{\Lambda}^{p,q}_\beta(\mathbb{R}^n)$ to $L^{p_0,q_0}(\mathbb{R}^{n+1}_+;\mu)$ via a newly introduced L^p-capacity associated with the Caffarelli-Silvestre extension or the fractional Besov capacities. Then, we establish the fractional anisotropic trace version of the Sobolev inequalities, logarithmic Sobolev inequalities and Hardy inequalities.

This talk is based on joint work with Rui Hu, Pengtao Li and Shaoguang Shi.