



Stability of the Fractional Sobolev and Caffarelli–Kohn–Nirenberg Inequalities

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Abstract

In this talk we explore the quantitative stability of two functional inequalities.

First, we consider the fractional Sobolev inequality

$$\int_{\mathbb{R}^N} |(-\Delta)^{s/2} u|^2 dy \geq S_{N,s} \|u\|_{L^{\frac{2N}{N-2s}}(\mathbb{R}^N)}^2,$$

with $N \in \mathbb{N}$ and $0 < s < N/2$. We establish the quantitative stability of critical points whose energy is close to that of a Talenti bubble. As an application, we obtain an explicit polynomial extinction rate for positive solutions of a fractional fast diffusion equation.

Second, we investigate the fractional Caffarelli–Kohn–Nirenberg inequality

$$\int_{\mathbb{R}^N} \int_{\mathbb{R}^N} \frac{(u(x) - u(y))^2}{|x|^\alpha |x - y|^{N+2s} |y|^\alpha} dx dy \geq \Lambda_{N,s,p,\alpha,\beta} \|u |x|^{-\beta}\|_{L^p}^2,$$

for $0 < s < \min\{1, N/2\}$, $2 < p < \frac{2N}{N-2s}$, and $\alpha, \beta \in \mathbb{R}$ satisfying

$$\beta - \alpha = s - N \left(\frac{1}{2} - \frac{1}{p} \right) \quad \text{and} \quad -2s < \alpha < \frac{N - 2s}{2}.$$

We prove non-degeneracy and sharp quantitative stability of minimizers for $\alpha \geq 0$.

We also show that minimizers remain symmetric when $\alpha \leq 0$ and p is close to 2.

This talk is based on joint work with F.Glaudo and T.König.



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Ore 15:00



Dipartimento di Matematica

Aula I

Organizzato dalla Prof.ssa Silvia Cingolani