Isoperimetric inequalities and (nonlocal) capillarity problems

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The classical capillarity problem aims at minimizing, among sets satisfying a volume constraint in a given container, a suitable weighted perimeter. We consider the contribution of the interface that touches the boundary of the container as being weighted by a fixed constant representing the relative adhesion coefficient between a liquid drop and the solid walls of the container. If the container is a halfspace, the isoperimetric sets for such problem are given by suitably truncated balls lying on the boundary of the halfspace

The aim of this talk is to present a new quantitative isoperimetric inequality for the capillarity problem in a halfspace, which estimates the asymmetry of a competitor relative to the optimal bubble with the corresponding isoperimetric deficit, together with some existence results when nonlocal repulsion and gravity are added.

The talk is based on an ongoing project in collaboration with M. Pozzetta.

References

[1] G.Pascale, M.Pozzetta, *Quantitative isoperimetric inequalities for classical capillarity problems*, arXiv, 2024.

[2] G.Pascale, *Existence and nonexistence of minimizers for classical capillarity problems in presence of nonlocal repulsion and gravity*, arXiv, 2024.