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Nonlinear potential theory through the looking-glass and the Penrose inequality we found there.

Wednesday, 25 June 2025 12:00 (1 hour)

The Riemannian Penrose inequality states that the total mass of a time-symmetric spacetime is at least as large as the mass of the black holes it contains. Among the various proofs of this inequality, two are based on monotonicity formulas coming from distinct theoritical frameworks: one by Huisken and Ilmanen employing the inverse mean curvature flow, and another by Agostiniani, Mantegazza, Mazzieri, and Oronzio grounded in nonlinear potential theory. However, both rely on stronger assumptions than those required by the formulation of the inequality.

In this talk, I will present a unified view that connects these two approaches. The monotonicity of the Hawking mass can be seen as the mirror image of a family of monotone quantities in potential theory: the two sides reflect and complete each other. This perspective allows us to extend the validity of the inequality to more general settings.

This talk is based on joint work with M. Fogagnolo, L. Mazzieri, A. Pluda, and M. Pozzetta.

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