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Matthew Badger* (matthew.badger@uconn.edu). *Two-phase free boundary problem for harmonic measure with Hölder data.*

I will report on joint work with Max Engelstein and Tatiana Toro. We continue the study of non-variational two-phase free boundary problems for harmonic measure. Previously, in separate and joint works, we showed that under appropriate a priori topological conditions on a pair of complementary domains $\Omega^\pm \subset \mathbb{R}^n$, if the Radon-Nikodym derivative of harmonic measure of one domain with respect to the harmonic measure of the other domain has α -Hölder continuous logarithm, then the common boundary of the domains splits into a regular set and a singular set: the regular set is an $(n-1)$ -dimensional $C^{1,\alpha}$ submanifold and the singular set is closed and has Hausdorff and Minkowski dimension at most $n-3$. In new work, we use a Weiss-type monotonicity formula and an epiperimetric inequality for homogeneous harmonic functions to obtain refined information about the singular set. In particular, we establish uniqueness of blowups and $C^{1,\beta}$ rectifiability of the singular set. (Received December 15, 2017)