Math 258 - Differential Geometry

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The topology of self-shrinkers and sharp entropy bounds.

Abstract:
The Gaussian entropy, introduced by Colding and Minicozzi, is a rigid motion and scaling invariant functional which measures the complexity of hypersurfaces of the Euclidean space. It is defined to be the supremal Gaussian area of all dilations and translations of the hypersurface, and as such, is well adapted to be studied by mean curvature flow. In the case of the n-th sphere in $\mathbb{R}^{n+1}$, the entropy can be computed explicitly, and is decreasing as a function of the dimension n. A few years ago, Colding Ilmanen Minicozzi and White proved that all closed, smooth self-shrinking solutions of the MCF have larger entropy than the entropy of the n-th sphere. In this talk, I will describe a generalization of this result, which derives better (sharp) entropy bounds under topological constraints. More precisely, we show that if M is any closed self-shrinker in $\mathbb{R}^{n+1}$ with a non-vanishing k-th homotopy group (with $k \leq n$), then its entropy is higher than the entropy of the k-th sphere in $\mathbb{R}^{k+1}$. This is a joint work with Brian White.

Special Note:
This is joint seminar with UC Irvine and UC Riverside.

Host: Lei Ni
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