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Monotonicity and entropy formulas for geometric evolution equations

TIME:
1 Feb 2010, 15:15

LOCATION:
Universität Potsdam,
Campus Am Neuen Palais
Haus 8, Raum 0.58

In this talk, we discuss monotone quantities which arise naturally in a variety of geometric heat flows such as mean curvature flow and Ricci flow. The monotonicity formulas feature scaling invariant integral quantities involving backward heat kernels which behave monotonically in time and 'stop changing' in the re-scaling limit. They can therefore be used to describe the structure of a solution near a singularity.
Entropy formulas in nonlinear evolution equations were first introduced by Perelman for the case of Ricci flow and played a crucial role in the resolution of the Poincare conjecture. We shall explain their significance and indicate how an analogue for mean curvature flow might look like and how this would solve a number of important open problems.

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