

Abstract

Oberwolfach Workshop:

**MATRIX-MFO Tandem Workshop:
Nonlinear Geometric Diffusion Equations**

Dates:

23 Feb - 28 Feb 2025 (Code: 2509b)

Organizers:

Theodora Bourni, Knoxville
Mat Langford, Canberra
Julian Scheuer, Frankfurt
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Geometric flows such as the harmonic map heat flow, the Ricci flow, and the mean curvature flow exploit the power of diffusion to canonically deform geometric structures towards equilibria (possibly after rescaling). This is both a natural procedure for proving the existence and regularity of such equilibrium states, as well as a powerful method for characterizing and organizing the permitted initial states (the equilibrium states being typically much easier to characterize than the initial ones). The diffusive nature of such equations also often allows even very rough initial data to be “instantaneously smoothed”; the ability to canonically smooth rough geometric objects is highly desirable for numerous geometric applications.

The theme of this workshop will be *singularity formation and resolution in nonlinear parabolic partial differential equations arising in geometry*. It will be guided by significant recent progress, related geometric and topological applications, and a number of difficult outstanding open problems.