



# UNIVERSITÀ DI PARMA

DIPARTIMENTO DI SCIENZE MATEMATICHE, FISICHE E INFORMATICHE

## SEMINARIO DI ANALISI MATEMATICA



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**Lunedì 24 novembre 2025, ore 14.00**

Aula Newton, Plesso di Fisica

### **Regularity vs singularity formation for harmonic map heat flows with free boundaries**

I will report on recent results on geometric flows associated to harmonic mappings with free boundary. Those maps are instrumental in several geometric problems, such as extremal metrics for the Steklov spectrum for instance and one can formulate several possible parabolic equations whose stationary solutions are such maps. I will describe these formulations, each of which offering interesting applications and analytic problems. In various cases, one can derive partial regularity results for weak solutions and describe the structure of the singular set. I will try to give an overview of such results. However, a formulation, related to the Plateau flow, poses more challenging issues and I will formulate some conjectures about its singularity formation. The construction of solutions blowing up in finite or infinite time uses a new gluing technique, which has been successfully used recently to investigate singularity formations in other flows, such as Fast Diffusion equations or Yang-Mills heat flow.

Organizzatore: Cristiana De Filippis