

# ISOLATED SINGULARITIES IN PARTIAL DIFFERENTIAL EQUATIONS

MARIUS GHERGU

The project aims at investigating both qualitative and quantitative aspects of singularities Partial Differential Equations (PDE) of the type

$$-\Delta u = f(x, u, \nabla u) \quad \text{in } B_1 \setminus \{0\} \subset \mathbb{R}^n.$$

Starting from various integral representations, the project intends to expand this knowledge to further qualitative properties of solutions to semilinear elliptic equations such as

- asymptotic behaviour around singularity point;
- existence of optimal upper bound of singular solutions;
- optimal conditions for which the singularity is removable.

In this project, particular interest will be paid to the analysis of the nonlocal terms such as in the case of Choquard equation and its related forms that are motivated by Quantum Mechanics.

**Background and Prerequisites.** The successful candidate is required to have a solid knowledge in Advanced Calculus.

## REFERENCES

- [1] M. Ghergu and S. Taliaferro, Isolated Singularities in Partial Differential Inequalities, Encyclopedia of Mathematics and Its Applications, Cambridge University Press, 2016, xvii+362 pp.
- [2] M. Ghergu and S. Taliaferro, Pointwise bounds and blow-up for Choquard-Pekar inequalities at an isolated singularity. J. Differential Equations 261 (2016), 189–217.