

## Seminario de EDPs

**Speaker:** Mircea Petrache (PUC)

**Title:** Crystallization of point configurations to the Square Lattice in 2D.

**Abstract:** We consider minimum-energy configurations  $x_1, \dots, x_N$  in euclidean space, minimizing the energy given by the sum of  $V(|x_i - x_j|)$  for all pairs of distinct indices  $i, j$ , with  $V$  an interaction potential.

Recent breakthroughs (Viazovska Ann. Math. 2017, Cohn-Kumar-Miller-Radchenko-Viazovska Ann. Math. 2017) led to a proof in [arXiv:1902.05438](https://arxiv.org/abs/1902.05438) that special lattices in dimensions 8 and 24 form "universally optimal configurations", i.e. optimize our energy at fixed density for a large class of  $V$ 's. This was recently extended (P.-Serfaty, Proc. AMS 2020) to include Coulomb interactions. It is conjectured that in 2 dimensions the triangular lattice is also "universally optimal". If proved, this would give as a corollary the "Abrikosov conjecture" in superconductivity. For now, "crystallization" in 2D to a triangular lattice is only known for localized one-well potentials  $V$  (Theil Comm. Math. Phys. 2006).

I will present a recent result with Betermin and De Luca [arxiv:1907.06105](https://arxiv.org/abs/1907.06105), in which we add a new proof of crystallization to the list, and prove for the first time that for a class of one-well potentials  $V$ , minimum-energy configurations in the plane form a square lattice instead of a triangular one.

**Martes 4 de agosto a las 4PM, en la dirección zoom:**

<https://uchile.zoom.us/j/88614875697?pwd=SkJuWC9ucEF4RU1DMVkwK1M3R25WQT09>

**pass: 125147**