

National and Kapodistrian University of Athens,
Panepistimiou 30, Athens, Greece, 106-79.

Partial Differential Equations Conference

Programme &
Book of Abstracts



10-12 of June, 2025

Table of Contents

1	Tuesday 10th of June, 2025	5
1.1	TBA (Hiroshi Matano)	5
1.2	TBA (Fabrice Bethuel)	5
1.3	TBA (Michael Sigal)	5
1.4	TBA (Juan Dávila)	6
1.5	TBA (Zhiyuan Geng)	6
1.6	TBA (Jarosław Mederski)	6
2	Wednesday 11th of June, 2025	7
2.1	TBA (Giorgio Fusco)	7
2.2	TBA (Arghir Zarnescu)	7
2.3	On a classification of steady solutions to two-dimensional Euler equations (Changfeng Gui)	7
2.4	Particles almost in contact: the method of reduced functionals in 3D (Denis Bonheure)	8
2.5	Normalised solutions to a fractional Schrödinger equation in the strongly sublinear regime (Jacopo Schino)	8
3	Thursday 12th of June, 2025	11
3.1	TBA (Guy David)	11
3.2	Liouville theorem for the one dimensional Gross-Pitaevskii equation (Michał Kowalczyk)	11
3.3	TBA (Filippo Santambrogio)	11
3.4	TBA (Nikos Katzourakis)	12
3.5	TBA (Tomasz Dłotko)	12

DAY 1

Tuesday 10th of June, 2025

WELCOME: 09:15-09:30

1.1 TBA (Hiroshi Matano)

Time: 09:30-10:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Hiroshi Matano (MEIJI)

Abstract: TBA

1.2 TBA (Fabrice Bethuel)

Time: 10:30-11:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Fabrice Bethuel (SORBONNE)

Abstract: TBA

COFFEE BREAK: 11:30-12:00

1.3 TBA (Michael Sigal)

Time: 12:00-12:55

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Michael Sigal (TORONTO)

Abstract: TBA

LAUNCH BREAK: 13:00-14:30

1.4 TBA (Juan Dávila)

Time: 14:30-15:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Juan Dávila (BATH)

Abstract: TBA

1.5 TBA (Zhiyuan Geng)

Time: 15:30-16:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Zhiyuan Geng (PURDUE)

Abstract: TBA

1.6 TBA (Jarosław Mederski)

Time: 16:30-17:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Jarosław Mederski (POLISH ACADEMY OF SCIENCES)

Abstract: TBA

END OF DAY 1

DAY 2

Wednesday 11th of June, 2025

2.1 TBA (Giorgio Fusco)

Time: 09:30-10:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Giorgio Fusco (L' AQUILA)

Abstract: TBA

2.2 TBA (Arghir Zarnescu)

Time: 10:30-11:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Arghir Zarnescu (BCAM)

Abstract: TBA

COFFEE BREAK: 11:30-12:00

2.3 On a classification of steady solutions to two-dimensional Euler equations (Changfeng Gui)

Time: 12:00-12:55

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Changfeng Gui (UNIVERSITY OF MACAU and ZHUHAI UM SCIENCE AND TECHNOLOGY RESEARCH INSTITUTE)

Abstract: In this talk, I shall provide a classification of steady solutions to two-dimensional incompressible Euler equations in terms of the set of flow angles. The first main result asserts that the set of flow angles of any bounded steady flow in the

whole plane must be the whole circle unless the flow is a parallel shear flow. In an infinitely long horizontal strip or the upper half-plane supplemented with slip boundary conditions, besides the two types of flows appeared in the whole space case, there exists an additional class of steady flows for which the set of flow angles is either the upper or lower closed semicircles. This type of flows is proved to be the class of non-shear flows that have the least total curvature. A further classification of this type of solutions will also be discussed. As consequences, we obtain Liouville-type theorems for two-dimensional semilinear elliptic equations with only bounded and measurable non-linearity, and the structural stability of shear flows whose all stagnation points are not inflection points, including Poiseuille flow as a special case. Our proof relies on the analysis of some quantities related to the curvature of the streamlines.

This talk is based on joint works with David Ruiz, Chunjing Xie and Huan Xu.

LAUNCH BREAK: 13:00-14:30

2.4 Particles almost in contact: the method of reduced functionals in 3D (Denis Bonheure)

Time: 14:30-15:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Denis Bonheure (UNIVERSITÉ LIBRE DE BRUXELLES)

Abstract: The formal analysis of the forces and torques on two moving solid particles suspended in a laminar flow and almost in contact with each other (or on a particle almost in contact with the wall of a container) traces back at least to Brenner and Cox in the late 1960's by using lubrication theory. While the stream function is defined up to a constant in 2D, the vector potential in 3D is defined up to a gradient and the choice of a gauge. I will show that by choosing an ad-hoc gauge, one can find the optimal potential by solving the dual formulation of a resulting Euler-Lagrange equation. This allows to compute (and fully justify) the asymptotic expansion of any Stokes solution when inclusions are close to isolated contacts. As a byproduct, we can derive the Stokes resistance matrix for a cloud of particles almost in contact. The construction is fully variational while the sharp asymptotics are basically based on estimates for a weighted elliptic operator in divergence form. I will start the talk by explaining the method on the easier problem of estimating the relative capacity of sets close to contact and showing a link with a missing weighted Hardy inequality.

The talk is based on a joint project with E. Bocchi (Pol. Milano) and M. Hillairet (Univ. Montpellier).

2.5 Normalised solutions to a fractional Schrödinger equation in the strongly sublinear regime (Jacopo Schino)

Time: 15:30-16:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Jacopo Schino (UNIVERSITY OF WARSAW)

Abstract: Schrödinger-type equations model a lot of natural phenomena and their solutions have interesting and important properties: one of them is the conservation of mass, which gives rise to the search for normalised solutions. In this talk, I will explain a possible approach to solve

$$\begin{cases} (-\Delta)^s u + \mu u = g(u) \\ \int_{\mathbb{R}^N} u^2 \, dx = m \\ (\mu, u) \in \mathbb{R} \times H^s(\mathbb{R}^N), \end{cases}$$

where $N \geq 2$, $0 < s < 1$, and $m > 0$ is prescribed, in cases that include the so-called strongly sublinear regime:

$$\lim_{t \rightarrow 0} \frac{g(t)}{t} = \infty \tag{2.1}$$

This makes a direct variational approach impossible because the energy functional is not well-defined in $H^s(\mathbb{R}^N)$. In the proposed approach, when m is sufficiently large, a family of approximating problems is considered so that the energy functional is of class \mathcal{C}^1 and a corresponding family of solutions is obtained, which eventually converge to a solution to the original problem. When (2.1) holds, the previous result for a suitably translated problem is exploited to obtain a solution for any $m > 0$.

This is joint work with Marco Gallo (Catholic University of the Sacred Heart, Brescia, Italy).

DINNER: 20:00

END OF DAY 2

DAY 3

Thursday 12th of June, 2025

3.1 TBA (Guy David)

Time: 09:30-10:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Guy David (SACLAY)

Abstract: TBA

3.2 Liouville theorem for the one dimensional Gross-Pitaevskii equation (Michal Kowalczyk)

Time: 10:30-11:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Michal Kowalczyk (UNIVERSITY OF CHILE, SANTIAGO)

Abstract: The asymptotic stability of the black and dark solitons of the one-dimensional Gross-Pitaevskii equation was proved by Béthuel, Gravejat and Smets and Gravejat and Smets, using a rigidity property in the vicinity of solitons. We provide an alternate proof of their Liouville theorems using a factorization identity for the linearized operator which trivializes the spectral analysis.

COFFEE BREAK: 11:30-12:00

3.3 TBA (Filippo Santambrogio)

Time: 12:00-12:55

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Filippo Santambrogio (LYON 1)

Abstract: TBA

LAUNCH BREAK: 13:00-14:30

3.4 TBA (Nikos Katzourakis)

Time: 14:30-15:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Nikos Katzourakis (READING)

Abstract: TBA

3.5 TBA (Tomasz Dlotko)

Time: 15:30-16:25

Location: Amph. Argiriadis, NKUA, Historical Building, Panepistimiou 30, Athens, 106-79

Speaker: Tomasz Dlotko (KATOWICE)

Abstract: TBA

END OF DAY 3

