



Optimal TranspOrt and large Deviations for Deep LEarning theory

FIS 3 Consolidator Grant

2026-2031

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Project Overview

OTODDLE is a 5-year research project funded under the Italian *FIS 3 Consolidator Grant* scheme. The project develops rigorous mathematical foundations for modern **Deep Learning**, combining tools from **Optimal Transport**, **Large Deviations**, **Probability Theory**, and **Statistical Learning Theory**.

The main goal is to understand training dynamics, generalization, and scaling limits of large neural networks using quantitative asymptotic methods and computationally informed analysis.

Host Institution

- University of Pisa, Department of Mathematics
- Strong research environment in Probability, Analysis, and Mathematical Physics
- Active international collaborations and interdisciplinary interactions

Planned Open Positions

Several positions will open during the project:

Starting from 2026

- **2+ Postdoctoral positions** (*contratto di ricerca*)
- **1 PhD position in Pure Mathematics**
- **1 IT Technician position** (4 years)
 - server maintenance, numerical infrastructure, support for simulations and HPC

Starting from 2027

- 1 PhD position in High Performance Scientific Computing
- 2+ Postdoctoral positions (*contratto di ricerca*)

Desired Background and Interests

Candidates are expected to have strong interest and background in one or more of the following areas:

- Probability theory (large deviations, quantitative CLTs)
- Statistical/mathematical learning theory
- Analysis (optimal transport, convex analysis, ODEs/PDEs)
- Numerical methods for optimization and stochastic processes
- Scientific computing and large-scale simulations

Interdisciplinary profiles are strongly encouraged.

Contact

For informal inquiries or expressions of interest:

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Early contact is welcome, especially from prospective postdoctoral and PhD candidates.