

The **Vienna School of Mathematics (VSM)** is a joint graduate school of the mathematics faculties of the **University of Vienna** and the **TU Wien**. The VSM is devoted to top-level PhD education in all branches of mathematics. It fosters intra- and interdisciplinary scientific cooperation and networking among students and advisors and aims at increasing the international visibility of the Vienna area as a center for mathematics.

The VSM currently announces a PhD position in the area of

### **Analysis of Deep Learning Methods for Singularly Perturbed PDEs (University of Vienna, Supervisor: Olga Mula)**

**Singularly Perturbed PDEs** arise in physical models where multiple processes—like convection and diffusion—interact across vastly different scales. These differences give rise to small parameters in the equations and produce solutions with sharp gradients and thin boundary layers, which pose serious challenges for numerical approximation.

This project aims to develop a rigorous mathematical framework to better understand how **Physics-Informed Neural Networks (PINNs)** perform when tackling these tough equations. We're diving into key questions such as: How does the presence of a small parameter affect the number of training points needed? How complex does the network architecture need to be to capture the solution accurately? In essence, we're exploring the frontier between modern machine learning and the most challenging problems in computational PDEs.

The ideal candidate will have prior exposure to modern developments in at least one of these fields: functional analysis, gamma convergence, numerical analysis of PDEs, mathematical foundations of deep learning, optimization, approximation theory, measure theory.

The advertised position is associated with the **Faculty of Mathematics of the University of Vienna**. The successful candidate will become a member of the Vienna School of Mathematics and is expected to actively contribute to its activities. The extent of employment is 30 hours per week. **The position is planned to start between September and December, 2025.**

### **Application Requirements and Procedure**

You can find all the details about the requirements and the procedure to apply [at this link](#). **The deadline for application is July 8, 2025.**