Workshop Syllabus

Physics-Informed Neural Networks & Applications

Quantum Formalism Academy

Overview

This specialised workshop introduces participants to the theory and applications of Physics-Informed Neural Networks (PINNs). By blending physics-based modelling with neural networks, PINNs offer a powerful framework for solving partial differential equations (PDEs) and advancing research and innovation in applied sciences and industry. The workshop combines theoretical foundations with real-world applications and market perspectives.

Schedule

- **Session 1: Theory and Fundamentals of Physics-Informed Neural Networks (PINNs)**
  In this session, we will present an overview of Physics-Informed Neural Networks (PINNs), exploring their theoretical foundations, main variants, and how this approach is transforming the way we address problems based on partial differential equations and complex physical systems. The goal is to provide a solid foundation for researchers, professionals, and enthusiasts who want to understand how PINNs differ from traditional neural networks and why they represent a significant step forward in the integration of physics and artificial intelligence.

- **Session 2: Physics AI — Applications and Market Opportunities**
  This session will be dedicated to the commercial and applied side of Physics AI. We will discuss how solutions based on PINNs and physics-driven AI models are being implemented across sectors such as energy, climate, engineering, and applied sciences. In addition, we will explore market trends, current use cases, and potential business opportunities emerging from this convergence of science and technology. The aim is to show how Physics AI can be not only a research tool but also a driver of innovation and competitive advantage for companies and industries.

Learning Outcomes

By the end of the workshop, participants will:

- Understand the theoretical underpinnings and main variants of PINNs.
- Recognise how PINNs differ from traditional neural networks.
- Explore applications of Physics AI across multiple sectors.
- Identify potential commercial and research opportunities in Physics AI.

Format & Duration

- **Tutorial Hours:** 4 hours total
- **Dates:** Tuesday, September 30 (1:00–3:00 PM BST)
  Friday, October 3 (2:00–4:00 PM BST)