

Annex 02 – MERC

Contract duration (max 24 months): 24 months

Researcher Profile

Researcher with a PhD in Engineering, Physics, or Applied Mathematics, with at least 3 months of international experience if the PhD was carried out in Italy. Expertise in complex systems modeling, network theory, nonlinear dynamics, control theory, and artificial intelligence. Ability to develop computational models and algorithms for the analysis of interconnected systems. Experience in publishing in international journals and participation in research projects. Excellent communication skills and interdisciplinary collaboration capabilities.

Research Project Description

The project focuses on modeling and analysis of interconnected complex systems, in line with the PNRR (National Recovery and Resilience Plan) objectives of innovation and digitalization. The researcher will develop advanced methodologies for the identification and control of emergent phenomena in complex networks, with particular attention to applications in critical infrastructures and socio-technological systems.

Research activities the post-doc researcher will undertake:

1. Development of mathematical models for adaptive complex systems
2. Design of machine learning algorithms for predictive analysis of emergent dynamics
3. Implementation of distributed control techniques for complex systems

Expected results include: innovative methodologies for the optimization of interconnected systems; computational tools for the simulation of emergent phenomena; adaptive management protocols for critical infrastructures.

The project will contribute to the digital transition promoted by the PNRR, improving the capacity to manage complex systems in strategic sectors such as energy, transportation, and communications, and promoting technological innovation through collaborations with national and international industrial partners.