In the framework of the activities of the PhD programme in Mathematical Sciences

Prof. **Francesco Carlo De Vecchi**

University of Bonn

will offer a PhD course on

Gaussian measures and applications to analysis and mathematical physics

Abstract

In many problems of probability, analysis and mathematical physics the problem of studying measures in infinite dimensional vector spaces arise in a natural way. The absence of a reference measure as the Lebesgue measure makes the rigorous definition of invariant measures in such spaces non-trivial. The main focus of the course is to provide an introduction to the theory of Gaussian measures in infinite dimensional spaces, in particular Hilbert spaces and Banach spaces, and their applications to constructive quantum field theory and the construction of singular solutions to evolution PDEs. We propose a proof of the existence of Gaussian measures in Hilbert spaces thanks to Bochner-Minlos-Sazonov theorem. Then some important properties of Gaussian measures are presented: Wick theorem and Wick product, chaos expansion of L^2 random variables and Hypercontractivity of Gaussian measures. Finally, some applications to invariant measures of hydrodynamics PDEs and SPDEs (such as the Euler equation or the stochastic Nevier-Stokes equation) and of Hamiltonian/hyperbolic PDEs and SPDEs will be presented.

Scheduling

The course will be held at the Department of Mathematics, Via C. Saldini n.50 – Milano

from 7 to 22 March 2022 with the following scheduling:

Monday **7**, from **3.30** pm to **6.30** pm
Tuesday **8**, from **3.30** pm to **6.30** pm
Wednesday **9**, from **3.30** pm to **6.30** pm
Thursday **10**, from **3.30** pm to **6.30** pm
Monday **14**, from **10.30** am to **12.30** pm
Tuesday **15**, from **3.30** pm to **6.30** pm
Thursday **17**, from **3.30** pm to **6.30** pm
Friday **18**, from **3.30** pm to **5.30** pm
Tuesday **22**, from **3.30** pm to **6.30** pm

Room: **Aula Dottorato**, 1st floor