Department of
Informatics, Systems
and Communication (DISCo)

PhD Talk: Spotlighting the Evolving Research @DISCo

Tuesday November 10th, 2026

at 10:30 am
Room "Sala Seminari" - Abacus Building (U14)

Causal-Probabilistic Modeling for Rare-Disease Research

Speaker **Niccolò Rocchi**

Abstract
Most AI models in medicine are purely probabilistic: they detect patterns in data but cannot explain how diseases evolve or why treatments work, which is what clinical decisions require. Causal Bayesian networks (CBN) address this gap by encoding cause-and-effect relationships in an interpretable graph, learned from both data and expert knowledge. In rare diseases, however, data are scarce and spread across institutions, and combining them raises privacy and statistical concerns. My research shows how CBNs and credal networks help learn from, protect, and combine evidence in this challenging setting. The talk is based on my PhD research.

Short Bio
Niccolò Rocchi is a Ph.D. candidate in Computer Science at the University of Milano-Bicocca, funded by Fondazione IRCCS Istituto Nazionale dei Tumori (INT) in Milan, and was a guest researcher at Eindhoven University of Technology (TU/e). He holds a B.Sc. in Mathematics from the University of Bologna and an M.Sc. in Data Science (cum laude) from the University of Milano-Bicocca. His research focuses on causal and probabilistic models for rare-cancer research, with particular attention to privacy and federated learning. His work has been published at ECAI 2025, UAI 2026, and in the Journal of Medical Systems and Frontiers in Digital Health, and has received the Best Paper Award at the HC@AIxIA 2024 workshop. He has also served as a reviewer and program committee member for HC@AIxIA and AIME.

Supervisor Fabio Stella

Spectral Geometry of Attention: from Information Routing to Uncertainty in LLMs

Speaker **Giulio Viganò**

Abstract
Understanding what happens inside large language models is key to making them reliable and safe. Attention is at the heart of these models, yet we still lack good tools to describe how it moves information between tokens. We take a geometric perspective on this problem, viewing attention maps as operators and studying their spectrum. We find that standard spectral tools are misled by attention sinks, and we introduce an intrinsic geometry, inspired by shape difference operators, that separates trivial averaging from real information routing. Beyond interpretability, this gives a simple tool to estimate uncertainty of LLMs beyond output logit statistics.

Short Bio
Giulio Viganò is a Ph.D. student in Computer Science at the University of Milano-Bicocca, supervised by Prof. Simone Melzi. He previously completed his M.Sc. in Applied Mathematics at the University of Milan, earning the Best MSc Thesis Award from EG-Italy. His research interests include Geometry Processing, 3D vision, and Geometric Deep Learning. He spent some time at Ecole Polytechnique to study the geometry of LLMs.

Supervisor Simone Melzi

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