National Institute for Theory and Mathematics in Biology

Funded by the U.S. National Science Foundation and the Simons Foundation

## New Developments in the Theory and Methodology of Graph Neural Networks

April 29 & 30, 2025 | NITMB @ John Hancock Center

## Tuesday April 29th

*Overview & Perspectives: A statistical take on GNNs & Mathematics of Deep Learning Chair: Claire Donnat* 

Speakers: Matus Telgarsky, Arash Amini, Gaurav Rattan, Johannes Schmidt-Hilbert, Morgane Austern, & Patrick Rubin-Delanchy

Time	Event Description
8:15 - 8:45	Light Breakfast
8:45 – 8:50	Welcome & Introduction of Institute
8:50 - 8:55	Housekeeping Announcements
8:55 – 9:00	Introduction to workshop: topics & objectives
9:00 – 9:55	"Tangential vignettes from LLMs and deep learning" – Matus Telgarsky
9:55 – 10:35	Talk: "A statistical take on GNNs" Session – Arash Amini
10:35 – 11:05	Talk: "A statistical take on GNNs" Session – Gaurav Rattan (remote on zoom, broadcast at NITMB)
11:05 – 11:15	Coffee Break
11:15 – 12:15	"Understanding the effect of GCN convolutions in regression tasks"– Johannes Schmidt-Hilbert
12:15 – 1:15	Lunch
1:15 – 1:55	Talk: "A statistical take on GNNs" Session – Morgane Austern
1:55 – 2:35	"The operation of a graph neural network when the graph follows a standard statistical model"– Patrick Rubin-Delanchy
2:35 – 2:45	Introduction to the afternoon session
2:45 – 3:45	Small Group Discussions – self-selecting groups
3:45 – 4:00	Coffee Break
4:00 – 4:30	Report Back
4:30 - 5:30	Poster Session & Drinks

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## Wednesday April 30<sup>th</sup>

Overview & Perspectives: Challenges in Manifold Learning & Beyond Graph Neural Networks Chair: Olga Klopp

Speakers: Patrick Wolfe, Zaid Harchaoui, Risi Kondor, Nina Miolane, & Johannes Lutzeyer

Time	Event Description
8:30 - 8:55	Light Breakfast
8:55 – 9:00	Welcome to Workshop & Housekeeping
9:00 – 9:55	Talk: "Challenges in Manifold Learning" Session – Patrick Wolfe
9:55 – 10:35	Talk: "Challenges in Manifold Learning" Session – Zaid Harchaoui
10:35 – 11:05	Coffee Break
11:05 – 11:45	"Higher order graph neural networks with P-tensors" – Risi Kondor
11:45 – 12:25	"Topological Deep Learning" – Nina Miolane
12:25 – 1:30	Lunch
1:30 - 2:10	"We Need Metrics for the Localisation and Factorisation of Learning Tasks on Graphs" – Johannes Lutzeyer
2:10 - 2:20	Introduction to the afternoon session
2:20 – 3:15	Small Group Discussions – self-selecting groups
3:15 – 3:30	Coffee Break
3:30 - 4:00	Report Back
4:00 – 4:15	Workshop Conclusion