

PHYSICS COLLOQUIA 2025



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Unraveling the Interplay of the Urban Form and Mobility Science for Planning Cities

3:00 pm | Classroom A | Via Celoria 16 | Milan

Predictive models for human mobility have important applications in many fields including traffic control, ubiquitous computing, and urban planning.

The predictive performance of models in the literature varies quite broadly, from over 90% to under 40%.

In the first part of my talk, I review the role of data and mobility metrics in the accuracy of mobility predictions.

We reveal that exploring new locations is an important factor in human mobility, and we measure that on average 20-25% of transitions are to new places, and approx. 70% of locations are visited only once. We discuss how these mechanisms are important factors limiting our ability to predict human mobility.

In the second part, I use individual mobility metrics to measure the urban spatial structure.

While it usually evolves slowly, it can change fast during large-scale emergency events, as well as due to urban renewal in rapidly developing countries.

This work presents an approach to delineate such urban dynamics in quasi-real-time through a human mobility metric, the mobility centrality index.

As a case study, we tracked the urban dynamics of eleven Spanish cities during the COVID-19 pandemic.

Results revealed that their structures became more monocentric during the lockdown in the first wave, but kept their regular spatial structures during the second wave.

To provide a more comprehensive understanding of mobility from home, we also introduce a dimensionless metric, which measures the extent of home-based travel and provides statistical insights into the transmission of COVID-19.



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