

Workshop on

“Putting the Cosmic Large-scale Structure on the Map: Theory Meets Numerics”

September 22 - 26, 2025

organized by

Oliver Hahn (U of Vienna), Cornelius Rampf (RBI, Zagreb), Cora Uhlemann (Bielefeld U)

• Monday, September 22nd, 2025

09:00 – 10:00 registration & welcome

10:00 – 10:20 David Alonso (U Oxford)

Projected clustering: the information in N -point statistics

10:20 – 10:40 Adrian E. Bayer (Princeton U)

Field-Level BAO Reconstruction and Beyond

10:40 – 11:00 Jiamin Hou (U of Cambridge)

4-point correlation function measurement from DESI Y1

11:00 – 11:20 Chiara Moretti (SISSA, Trieste)

Measuring dark energy without prior-volume effects

11:20 – 11:40 Jens Jasche (U Stockholm)

Tracing Cosmic Origins: Building a Digital Twin of the Universe with Field-Level Inference

12:00 – 14:00 lunch break

14:00 – 14:20 Julia Stadler (MPI for Astrophysics, Garching)

Perturbative Forward-Modeling of Galaxy Surveys for Field-Level Cosmology

14:20 – 14:40 Kazuyuki Akitsu (KEK, Tsukuba)

Do we really gain from field-level inference? A comparison with joint power spectrum and bispectrum analysis

14:40 – 15:00 online talk (TBC): Krause (Arizona)

15:00 – 15:30 coffee break

15:30 – 18:00 discussion / breakout sessions

• Tuesday, September 23rd, 2025

09:00 – 09:20 online talk: Yin Li (PCL)

Differentiable modeling of the Universe in the age of machine learning

09:20 – 09:40 Carolina Cuesta-Lazaro (Harvard U, Cambridge)

Implicit vs Explicit field level inference

09:40 – 10:00 Jia Liu (Kavli IPMU)

HalfDome Cosmological Simulations

10:00 – 10:30 coffee break

10:30 – 12:00 discussion session

12:00 – 14:00 **lunch break**

14:00 – 14:20 **Laila Linke (U of Innsbruck)**

Third-Order Weak Lensing as a Bridge to Simulation-Based Inference

14:20 – 14:40 **Cornelius Rampf (RBI, Zagreb)**

Time-efficient cosmological simulations with and without a quantum analogue

14:40 – 15:00 **Tomasz Kacprzak (PSI, Villigen)**

Combined probes with AI-SBI

15:00 – 15:30 **coffee break**

15:30 – 18:00 **discussion / breakout sessions**

- **Wednesday, September 24th, 2025**

09:00 – 09:20 **Guido D’Amico (U of Parma)**

The analysis of DES 3×2pt data within the EFTofLSS

09:20 – 09:40 **Florian List (MPI for Astrophysics, Garching)**

DISCO-DJ: Differentiable Simulations for COsmology - Done with Jax

09:40 – 10:00 **Thomas Flöss (U of Vienna)**

Field-level inference with DISCO-DJ

10:00 – 10:30 **coffee break**

10:30 – 10:50 **Ken Osato (U Chiba)**

Field-level inference with differentiable GridSPT forward model

10:50 – 11:10 **Takahiro Nishimichi (Kyoto Sangyo University)**

A propagator-based approach to mitigate cosmic variance in cosmological N-body simulations

11:10 – 12:00 **discussion session**

12:00 – 14:00 **lunch break**

14:00 – 14:20 **Natalia Porqueres (CEA Paris-Saclay)**

Field-level inference of weak lensing data

14:20 – 14:40 **Zoltan Haiman (ISTA, Klosterneuburg)**

The effect of intrinsic alignments on weak lensing statistics in hydrodynamical simulations

14:40 – 15:00 **Eleni Tsaprazi (Imperial College London)**

Field-level inference of H_0 from simulated type Ia supernovae in the local Universe

15:00 – 15:30 **coffee break**

15:30 – 17:00 **discussion / breakout sessions**

18:00 – 21:00 **workshop dinner**

- **Thursday, September 25th, 2025**

09:00 – 09:20 **Online talk: Boryana Hadzhiyska (UC, Berkeley)**

Searching for Primordial Non-Gaussianity: Spectroscopic Surveys & Zero-Bias Tracers

09:20 – 09:40 **Drew Jamieson (MPI for Astrophysics, Garching)**

Simulating the Initial Conditions of the Universe

09:40 – 10:00 **Ashim Sen Gupta (Bielefeld U)**

Abbreviating the simulation of structure formation in extended cosmologies

10:00 – 10:30 **coffee break**

10:30 – 12:00 **discussion session**

12:00 – 14:00 **lunch break**

14:00 – 14:20 **Jens Stücker (U of Vienna)**

Gaussian Lagrangian Galaxy Bias

14:20 – 14:40 **Florent Leclercq (IAP, Paris)**

Accelerated forward modelling of dark matter dynamics: ML-safety and perfect parallelism

14:40 – 15:00 **Cora Uhlemann (Bielefeld U)**

Going Below and Beyond: A Dive into One-Point Statistics

15:00 – 15:30 **coffee break**

15:30 – 17:00 **discussion / breakout sessions**

20:00 – 21:00 **guided visit at the observatory**

• **Friday, September 26th, 2025**

09:00 – 09:20 **Ben Horowitz (Kavli IPMU)**

Novel Forward Models and Solver-in-Loop Approaches for Joint Astrophysics and Cosmological Constraints

09:20 – 09:40 **Zvonimir Vlah (RBI, Zagreb)**

Modelling Cosmological Correlators on the Sky

09:40 – 10:00 **Guilhem Lavaux (IAP, Paris)**

Cosmic velocity field for cosmological parameter inference

10:00 – 10:20 **Azadeh Moradinezhad Dizgah (LAPTh Annecy)**

Parity in Composite-Field Galaxy Correlators

10:20 – 11:00 **coffee break**

11:00 – 12:00 **workshop summary**

All talks take place at ESI Boltzmann Lecture Hall!