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**UNIVERSITÄT
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STRUCTURES JOUR FIXE

Alexey Kazarnikov & Stefano Rinaldi

IMa / ZAH

From Turing Patterns to Black Holes

A Simulation-Based Inference of Binary Black Hole
Populations Using the Correlation Integral Likelihood

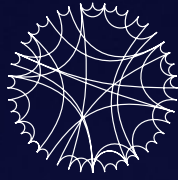
Pretalk by Stefano Rinaldi at 1pm

OCTOBER 23, 2026, 1:30 PM, Philosophenweg 12 GHs

COFFEE & SNACKS IN ROOM 106

ZOOM: Meeting ID: 935 6549 3662, Code: 928036

CONTACT: office@structures.uni-heidelberg.de



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ABSTRACT

Since their discovery 11 years ago, binary black holes observed via gravitational waves represent a unique laboratory for addressing key questions in fundamental physics, cosmology and, crucially, astrophysics: as compact remnants left after the death of binary stars, binary black holes provide invaluable information about the processes driving the evolution of the most massive of stars as well as about the galactic environment they formed in.

In this talk, we will present a new approach, borrowed from an unexpected place: the Correlation Integral Likelihood (CIL) was developed to estimate parameters of chaotic dynamical systems and was later applied to models of biological pattern formation, such as Turing patterns, where the same parameters can produce many different-looking outcomes. CIL turns the question "how probable are the observations?" into the simpler question "how close are real data to data the model can generate?"

We will introduce the method from scratch, explain how we adapted it to gravitational-wave catalogues and their measurement uncertainties, and show that it recovers a black hole distribution consistent with the available literature. We conclude with an outlook on scaling the method to the hundreds of thousands of detections per year expected from next-generation observatories such as the Einstein Telescope.

Upcoming talks in this semester's STRUCTURES Jour Fixe

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