

EINLADUNG ZUM KOLLOQUIUM

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Population Synthesis in Gravitational Wave Astronomy

Population synthesis in astrophysics “does not have direct analogues in other fields of science” (Popov and Prokhorov 2007). It allows for simulation of the initial and evolutionary parameters of the population under consideration, crucial for explanation and prediction. Showing how the parameters of binary systems evolve (Broekgaarden et al. 2021, Hamers et al. 2021), how to distinguish systems from background radiation, estimating population size (Cieslar et al. 2021), how to use the parameters of binary systems as 'standard sirens' to estimate background radiation (Chen, Fishbach, & Holz 2018), and how to generate matched filtering templates appropriate to predictions of systems likely to be detected, all benefit from population synthesis. Thus, the method is key to the future of gravitational-wave astrophysics. This paper will present the fundamentals of population synthesis in gravitational-wave astrophysics, with a view to explaining how it is used in template-based searches and parameter estimation. It will conclude with a brief analysis of challenges for building population synthesis methods that provide a robust framework for future research.

Lydia Patton is professor at the department of philosophy at Virginia Tech. She got her PhD at McGill University and has previously worked at Boston University, the University of Chicago as well as the University of Notre Dame. Much of her recent work centers on philosophical analysis of science and the history of science: especially on the development of experimental and formal methods, hypotheses, frameworks, and scientific communities. One of her current research projects is on interpreting and analyzing LIGO gravitational-wave astronomy.

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