

JOINT TUFTS/MIT COSMOLOGY SEMINAR

*Primary thermalisation mechanism of Early
Universe observed from Faraday-wave
scattering on liquid-liquid interfaces*

Silke Weinfurtner
Nottingham

Parametric instabilities can be responsible for dramatic events, from the collapse of bridges and rolling of ships at sea to the thermalisation of our universe following cosmic inflation, 13.8 billion years ago. In a leading theory for the thermalisation of the Early Universe, known as preheating, broad parametric resonance efficiently transfers the energy of the inflaton field to other fields and particles, thus producing the hot plasma required for the Big Bang theory to proceed. However, direct observations of the non-linear dynamics of preheating in the early universe are not feasible. I will present a controlled experiment to simulate the key aspects of inflationary preheating in a parametrically driven interface between two fluids. We study the scattering of large amplitude Faraday waves and observe a broadening of primary resonance bands and the subsequent appearance of secondary instabilities and their estimated growth rates, as predicted in preheating. Finally, I will elaborate on the possibility to set up tabletop experiments to reconstruct some of the most elusive and fascinating processes related to the early universe beyond preheating.

Tuesday, November 29, 2022, 2:30 pm

Zoom link will be distributed to joint cosmology seminar mailing list. See <https://cosmos.phy.tufts.edu/mailman/listinfo/cosmology-seminar> to join.

Massachusetts Institute of Technology