

2025 FALL

POSTECH
Basic Science Research Institute

APCTP-POSTECH MINDS JOINT SEMINAR

Action approach to IBVPs and the quest for space-time symmetry conservation

Invited Speakers : Alexander Karl Rothkopf(KOREA UNIVERSITY)

Date(Time) : Oct 21(Tue) 16:00 ~17:00

Place : Mueunjae Memorial Hall (APCTP Center), Room 512

Abstract: The breaking of space-time symmetries in numerical simulations remains a central hurdle in both classical and quantum simulations. The absence of fundamental continuous symmetries via Noether's theorem breaks the conservation of central physical quantities, such as energy or momentum. The goal of this talk is twofold: on the one hand we will explore how to formulate initial boundary value problems on the level of the classical action, which not only allows us to cleanly exhibit system symmetries, but also allows us to solve for the classical solution via a variational principle bypassing governing equations [1]. On the other hand we will report on recent progress in constructing a classical action for scalar wave propagation [2], which features dynamical coordinate maps and which allows continuous space-time symmetries to be maintained even after the system has been discretized. A first proof-of-principle of the approach based on 1+1d wave propagation is presented and open question will be discussed.

[1] A.R., J. Nordström, J.Comput.Phys. 477 (2023) 111942 / arXiv:2205.14028

[2] A.R., W.A. Horowitz, J. Nordström, J.Comput.Phys. 524 (2025) 113686 /arXiv: 2404.18676