



Department of
Theoretical Physics

THE QUANTUM SPACETIME SEMINAR SERIES

Dispersion relations and knot theory

(Zoom Seminar)

Aninda Sinha

(IISc, Bangalore)

Date: May 30, 2022

Time: 11 AM IST

Zoom link shall be shared separately



I show that the crossing symmetric dispersion relation (CSDR) for 2-2 scattering leads to a fascinating connection with knot theory. In particular, the dispersive kernel can be identified naturally in terms of the generating function for the Alexander polynomials corresponding to the torus knot $(2, 2n+1)$ arising in knot theory. In the low energy expansion, the difference between the $(n+1)$ -th and n -th derivatives of the scattering amplitude with respect to the crossing symmetric variable can be bounded in terms of the torus $(2, 2n+1)$ -knot invariants and the resulting bounding curve in the space of allowed S-matrices can be determined analytically in terms of the $(2, 2n+1)$ -torus Alexander polynomial. The agreement with the pion S-matrix bootstrap is impressive. The global bounds are derived using Geometric Function Theory (GFT) techniques and shown to be identical. I discuss tree level type II string theory using the CSDR-knot connection. Finally, I correlate the q -deformed harmonic oscillator with the CSDR-knot picture.

Infosys