Contribution ID: **91**   Type: **Poster**

Celestial Insights into S-matrix Bootstrap

We consider 2-to-2 celestial scattering amplitudes for massless external particles in d=4 dimensions using crossing symmetric dispersion relations employed in recent studies of the S-matrix bootstrap. The crossing symmetric dispersive representation of the amplitude has spurious singularities for complex values of the celestial cross-ratio z, which need to be removed in local QFTs. We show that these locality constraints lead to novel bounds on moments of partial waves in the corresponding momentum space amplitude. Imposing the locality constraints, the crossing symmetric amplitude can be expanded in terms of so-called Feynman blocks. In terms of the celestial variables, these blocks have the remarkable mathematical property of being typically real, in the sense of Geometric Function Theory (GFT). This allows us to use GFT techniques to derive non-projective bounds on Wilson coefficients in terms of partial wave moments.

We then show that the use of celestial variables reveals a novel positivity property of the low energy expansion of 2-to-2 amplitudes in a wide class of theories. We prove that this positivity is due to the dominance of spin-zero partial waves. We also study the celestial conformal block decomposition of the EFT expansion of 4-point amplitude of massless external scalars and relate celestial CFT OPE coefficients to Wilson coefficients.

Author: GHOSH, Sudip (Indian Institute of Science)

Presenter: GHOSH, Sudip (Indian Institute of Science)

Session Classification: Reception & Poster session