

The complex and projective geometry of Penrose Limits

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Talk abstract

I will present joint work of myself and Jonathan Holland of the University of Rochester.

Penrose limits are plane wave spacetimes that encode the Sachs equations governing the geometry of any spacetime in the immediate neighbourhood of a null geodesic of that spacetime.

They also provide a link to quantum mechanics in that their symmetry groups form the conformal Heisenberg group.

If complex methods are to be universally useful in analyzing Einstein's General Relativity, then Penrose limits provide an important arena to test out ideas.

I will show how Penrose limits are connected to generalizations of Teichmüller space and at the same time are deeply related to concepts of projective geometry: indeed the curvature of a Penrose limit spacetime is a kind of generalized cross-ratio.