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Integrability of the $AdS_5 \times S^5$ Superstring

We study integrability aspects of superstrings on $AdS_5 \times S^5$. We show that a one parameter family of flat currents, which is gauge equivalent to that obtained by Bena, Polchinski and Roiban, is manifestly invariant under a generalized Z_4 transformation. This symmetry is expected to simplify analysis of the currents because the Z_4 transformation is an automorphism of $PSU(2, 2|4)$, the isometry in the theory.

We perform the canonical analysis of the theory. Especially we calculate the Poisson bracket of the currents. This bracket results in an algebra which includes a Schwinger term. Because of the Schwinger term, more work is needed in understanding the quantum integrability properties of the system.