

# String scattering amplitudes and symmetries in string theory

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We study open bosonic string scattering amplitudes and relations among them in various energy limits to explore the symmetries in string theory. By explicitly calculating the 4-point string amplitudes with three tachyons and one arbitrary string state, we find that there is a hidden symmetry in string theory associated with  $SL(K + 3, C)$  group. Many known relations can be obtained from this result by taking various limits, such as BCJ relation, linear relation in hard limit, etc.