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Tree-level Scattering Amplitude of closed string Tachyons in Orientifold theories

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The famous paper [1] by Kawai, Lewellen and Tye (KLT) showed that n-closed strings scattering amplitudes at tree-level on the sphere can be calculated and written in terms of n-open strings scattering amplitudes on the disk, using well known techniques of complex analysis. Their results can be summarised (schematically) by "$Gravity = (Gauge)^2$". In the context of Orientifold theories, tree-level scattering amplitudes involving closed string Tachyons were considered in order to extend their relationship with scattering amplitudes of open string Tachyons. String g_s-perturbation theory for orientifold theories involves both *oriented* and *unoriented* surfaces, having Euler characteristic $\chi = 2 - 2g - b - c$ with g-genus, b-boundaries and c-crosscaps. Oriented theories at tree-level are analysed in [1] and [2,3], where only oriented surfaces enter the calculations, respectively Sphere (S2) and Disk (D2). Following [1,2,3], we investigate the less studied tree-level string scattering amplitudes on an unoriented surface, the Real Projective Plane (RP2) [4], and the relation between n-closed strings and $2n$-open strings is found.

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