

DNA mutations via Chern-Simons Current

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The schematization of DNA structure can be tested by the Chern–Simons theory, that is a topological field theory mostly considered in the context of effective gravity theories. By means of the expectation value of the Wilson Loop, derived from this analogue gravity approach, it is possible to find the point-like curvature of genomic strings in KRAS human gene and COVID-19 sequences, correlating this curvature with the genetic mutations. The point-like curvature profile, obtained by means of the Chern–Simons currents, can be used to infer the position of the given mutations within the genetic string. Generally, mutations take place in the highest Chern–Simons current gradient locations and subsequent mutated sequences appear to have a smoother curvature than the initial ones, in agreement with a free energy minimization argument.

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