Remarks on the non-Riemannian sector in Double Field Theory

KYOUNGHO CHO

Department of Physics, Sogang University, 35 Baekbeom-ro, Mapo-gu, Seoul 04107, Korea

khcho23@sogang.ac.kr

Abstract

Taking $\mathbf{O}(D,D)$ covariant fields as the truly fundamental variables, Double Field Theory may accommodate not only conventional supergravities but also non-Riemannian gravities that can be classified by two non-negative integers, $(n,\bar{n})$ [1]. A generic $(n,\bar{n})$ non-Riemannian background renders propagating strings chiral and anti-chiral over n and $\bar{n}$ dimensions respectively. Examples include, but are not limited to, Newton–Cartan, Carroll, or Gomis–Ooguri. Here, as a sequel to [1], we analyze the variational principle for the generic $(n,\bar{n})$ non-Riemannian sector. We report a nontrivial subtlety for $n\bar{n}\neq 0$ which may indicate that the various non-Riemannian gravities had better be treated as different solution sectors of Double Field Theory rather than independent theories. We fix a section and expound the equations of motion of the non-Riemannian sector in a manifestly covariant manner under diffeomorphisms, Milne-shift transformations, and $\mathbf{GL}(n)\times\mathbf{GL}(\bar{n})$ rotations. Separate verification of our results as string worldsheet beta-functions may enlarge the scope of the string landscape far beyond Riemann.

References

[1] K. Morand and J. H. Park, "Classification of non-Riemannian doubled-yet-gauged spacetime," Eur. Phys. J. C **77** (2017) no.10, 685 Erratum: [Eur. Phys. J. C **78** (2018) no.11, 901] doi:10.1140/epjc/s10052-017-5257-z, 10.1140/epjc/s10052-018-6394-8 [arXiv:1707.03713 [hep-th]].