M U N I

COMMENTARY TO HABILITATION THESIS

The thesis *Integrable deformations of strings* by Linus Wulff deals with deformations of string sigma models which have the property that they preserve integrability. This means that starting from an integrable string sigma model and deforming it one obtains a new integrable model, which reduces to the original one when the deformation parameter is taken to zero. There are different types of such deformations but a large class, which are the focus of the thesis, are the so-called Yang-Baxter deformations. They are defined by a constant matrix R which solves the classical Yang-Baxter equation. After introducing these deformations in the simplest setting of the Principal Chiral Model, we describe their close relation to the transformation known as non-abelian T-duality. In the case of string theory there are additional conditions on the sigma model. In particular, it must be Weyl invariant. We show that Yang-Baxter deformations preserve the Weyl invariance to at least two loop order in the sigma model perturbation theory, provided R satisfies a so-called unimodularity condition. The proof of this important fact is greatly simplified by working in a formalism with an enlarged symmetry group, known as Double Field Theory. This also allows us to find the first quantum correction to these deformed models.

This thesis summarizes my work over the past five years on the topic of integrable deformations of string sigma models. Out of my 50 publications I have chosen 9 research articles related to integrable Yang-Baxter deformations to form part of the thesis. My contribution to these articles is summarised in the following tables with special attention given to supervision of students, manuscript preparation and research direction.

[1] S. Hronek and L. Wulff, "Relaxing unimodularity for Yang-Baxter deformed strings", JHEP 10 (2020), 065

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
-	100	80	80

[2] R. Borsato and L. Wulff, "Quantum Correction to Generalized T Dualities", Phys. Rev. Lett. 125 (2020) no.20, 201603

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
-	-	50	50

[3] R. Borsato, A. Vilar Lopez and L. Wulff, "The first alpha'-correction to homogeneous Yang-Baxter deformations using O(d, d)", JHEP 07 (2020) no.07, 103

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
-	-	50	50

[4] R. Borsato and L. Wulff, "Two-loop conformal invariance for Yang-Baxter deformed strings", JHEP 03 (2020), 126

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
-	-	50	50

[5] R. Borsato and L. Wulff, "Marginal deformations of WZW models and the classical Yang-Baxter equation", J. Phys. A 52 (2019) no.22, 225401

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
-	-	50	50

[6] R. Borsato and L. Wulff, "Non-abelian T-duality and Yang-Baxter deformations of Green-Schwarz strings", JHEP 08 (2018), 027

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
-	-	50	50

[7] R. Borsato and L. Wulff, "On non-abelian T-duality and deformations of supercoset string sigma-models", JHEP 10 (2017), 024

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
-	-	50	50

[8] R. Borsato and L. Wulff, "Integrable Deformations of T-Dual sigma Models", Phys. Rev. Lett. 117 (2016) no.25, 251602

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
-	-	50	50

[9] R. Borsato and L. Wulff, "Target space supergeometry of eta and lambda-deformed strings", JHEP 10 (2016), 045

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
-	-	50	50