

**FOUNDATIONAL ISSUES RELATED TO
THE CONTENTS
OF THIS CONFERENCE AND SUMMER SCHOOL**

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In connection with controversial issues on (special) relativity is the fact that the rotation subgroup is not normal subgroup in the Lorentz group. This is similar in nature to the Thomas rotation and non-associativity of composition of velocities. I shall argue that there is the rival alternative to the Lorentz isometry, namely the mathematical structure of the groupoid category that is not a group. On a more physical note, this may have to do with the observations on homographies that Jose Vargas will be making in his presentation.

Of importance is the concept of Kähler-Atiyah algebra. Erich Kähler in 1960-1962 [1] and M. F. Atiyah in 1964 [2] introduced two algebras, Grassmann and Clifford, acting simultaneously on the same domain. I shall summarise here my 1986-paper [3] about the tensor product of algebras. The idea goes back to Cartan, exemplified by his statement that the Riemannian curvature is a bivector-valued differential form.

I want to discuss the controversial belief about the pre-eminence of the differential forms over vector fields (and what this has to do with differentiation versus integration). Another subject worthy to clarify: can we use Stoke's formula to define exterior derivation of differential forms that do not satisfy standard conditions of differentiability?

REFERENCES

- [1] E. Kähler. "Der innere Differentialkalkül", *Rendiconti di Matematica e delle sue Applicazioni* **3-4** (1962) pp. 425-523.
- [2] M. F. Atiyah, R. Bott, and A. A. Shapiro. "Clifford Modules", *Topology* **3**, supplement 1 (1964) pp. 3-38
- [3] Z. Oziewicz. "From Grassmann to Clifford" in J. S. R. Chisholm and A. K. Common, editors, *Clifford Algebras and their Applications in Mathematical Physics*. D. Reidel Publishing Company (Dordrecht 1986), pp. 245-255.