Zurich-1310

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Informal Talks on the Topology, Combinatorics, and Low and High Algebra of w-Knots

Abstract. Taylor's theorem maps smooth functions to power series. In other words, it maps the smooth to the combinatorial and algebraic, which is susceptible to an inductive degree-by-degree study. Surprisingly, there is a notion of "expansions" for topological things, which shares the spirit of the original Taylor expansion while having nothing to do with approximations of smooth functions.

"w-Knots", or more generally "w-knotted objects", are knotted 2-dimensional objects in 4-dimensional space (some restrictions apply). They have a rich theory of "expansions" which takes topology into combinatorics. That combinatorics, in itself, turns out to be the combinatorics of formulas that can be written universally in arbitrary finite-dimensional Lie algebras ("low algebra"). Taylor's theorem for a certain class of w-knotted objects turns out to be equivalent to some global statements about Lie algebras and Lie groups ("Kashiwara-Vergne", "high algebra"). I will do my best to talk about all these things.

"w-Knotted objects" contain the usual "u-knotted objects" (braids, knots, links, tangles, knotted graphs, etc.) and are quotients of the more general "v-knotted objects". To within reason I will also speak about the relationship of "w" with "u" and "v", where the key words are "associators" and "Lie bi-algebras", respectively.

Anna asked me to talk for up to 6 hours, and that's more than I can prepare in detail in advance. Hence the adjective "informal": I have a general idea of what I want to say and much of it I've said many times before. Beyond that things will flow, if they don't stand still, chaotically and randomly.

Tentative plan:

Day 1. The Bern & Oct 24 Geneva handouts.

Day 2. The Bonn sequence.
The IfC paper.

Day 3. KBH & β.