What's next?

March 15, 2024 1:20 PM

China talk?
CMX talk?

* Multi-variable ρ_1?
* understand Roland's "n" program?
* writeup of DoPeGDO?
* Kauffman-state homology?
* Writeup of palindromicity?
* Writeup of pushforwards?

China talk: "I-Type knot Invariants"

Abstract: An I-Type knot invariant is a knot inv. obtained by integrating the exponential of a Lagrangian, defined locally from a knot diagram D, over a product of spaces locally associated to the features of D. Q&A: Are there any? (Yes) Are they any good? (They are the strongest per CPU cycle, and there are reasons to hope for more). Integration? (Squiky clean algebra)

chapters.

* Elucidation of the definition.
* Example: Alexander
* What's integration? * G
* Implementation.
* Example: $\rho_1(T)$ * Example: $\rho_d(T)$
* What's integration? * PG
* Implementation.
* Example: $\rho_1(U,V)$
* Implementation
* Origins & prospects.

Title. Knot Invariants from Finite Dimensional Integration.

Abstract. For the purpose of today, an "I-Type Knot Invariant" is a knot invariant computed from a knot diagram by integrating the exponential of a Lagrangian which is a sum over the features of that diagram (crossings, edges, faces) of locally defined quantities, over a product of finite dimensional spaces associated to those same features.

Q. Are there any such things?
A. Yes.
Q. Are they any good?
A. They are the strongest we know per CPU cycle, and are excellent in other ways too.
Q. Didn't Witten do that back in 1988 with path integrals?
A. No. His constructions are infinite dimensional and far from rigorous.
Q. But integrals belong in analysis!
A. Ours only use squeaky-clean algebra.

$$I_\lambda := \int dx_1 P(x+x_1) e^{\frac{\lambda^{-1}}{2}Q(x_1) + V(x+x_1)} \qquad I_0 = P(x)e^{V(x)} \cdot (\det Q)^{-1/2}$$

$$\partial_\lambda I_\lambda = -\int dx_1\, P(x+x_1)\, e^{\lambda^{-1}/2\, Q(x_1) + V(x+x_1)} \cdot \frac{1}{\lambda^2} Q(x_1)$$

Knot Invariants from Finite Dimensional Integration

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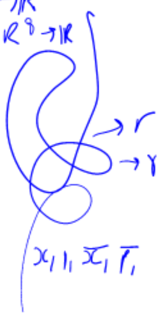
$\exists\ \gamma:\mathbb{R}^4\to\mathbb{R}$, $r^\pm:\mathbb{R}^8\to\mathbb{R}$ s.t.



$\longrightarrow \int_{\mathbb{R}^{28}_{x_i p_i \xi_i \pi_i}} \exp\left(\sum_{c\,(s,i,j)} + \sum_k\right)$ is an invariant.

need an explain

Thm as in Oaxaca

Formulas of $\gamma, r^\pm$.

So what? * yet another philosophy for invariants
* strongest per CPU cycle?
* Easy, despite appearances.
* Has applications to topology, may have crazy good ones (not today, but see ...)

Knots:  / R123 $\xrightarrow{\text{invariants}}$ something simple?

Knot table in background.

The good: 1. At the centre of low dim top
2. "Invariants" connect to pretty much all of algebra

The agony: 1&2 don't talk well to each other
* Not enough topological applications of all these invariants
* The fancy algebra doesn't come naturally to a topologist.

$\Longrightarrow$ We're still missing something about the relationship between knots & algebra