

Cosmic Coincidences and Several Other Stories, 1
Dror Bar-Natan at the University of Toronto
March 4, 2011, <http://www.math.toronto.edu/~drorbn/Talks/Toronto-110304>

Cosmic Coincidences and Several Other Stories, 2
Dror Bar-Natan at the University of Tennessee
March 4, 2011, <http://www.math.unt.edu/~drorbn/Talks/Tennessee-110304>

The Stonehenge story

Abstract
beauty & cracks

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The u-story 2: QFT, Feynman diagrams.
3: Conf. space integ.
1. Low Alg, Jones, Homfly
4. Finite type, expansions.
5. High algebra.

The w-story

The v-story

The p-story.

$u \rightarrow v \rightarrow w \quad \neq ?$

Fix.
gap

From Istanbul-0606:

Witten, Stonehenge, Lie and Vassiliev
Arithmetic and Geometry Around Quantization, Istanbul, June 2006 (Lecture D)
Dror Bar-Natan, University of Toronto

Feynman diagrams for the Chern-Simons-Witten theory:

When at the dust settles this becomes the generating function of all stellar coincidences:

$Z(K) = \sum_{\text{stars}} \frac{1}{|L(\text{star})|} \sum_{\text{chopsticks}} \frac{1}{|L(\text{chopstick})|} \sum_{\text{edges}} \frac{1}{|L(\text{edge})|} \dots$

$N = \# \text{ of stars}$
 $c = \# \text{ of chopsticks}$
 $e = \# \text{ of edges of } D$

The Gaussian linking number

When deforming, catastrophe occurs when:

The Gauss curve slides over a star.

Theorem. Modulo Relations, $Z(K)$ is a knot invariant!

The BIK Relation

Definition. V is finite type (Vassiliev, Goussarov) if v vanishes on sufficiently large alterations as on the right.

Theorem. All knot polynomials (Coxeter, Jones, etc.) are of finite type.

Conjecture. (Taylor's theorem) Finite type invariants separate knots.

Theorem. $Z(K)$ is a universal finite type invariant (like h ; to date in many parties, you need many feet).

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<http://math.utoronto.ca>

Many sources might be at UCB-000420

From UWO-100225

The u-v-w Story

	u-Knots	v-Knots	w-Knots
Topology	Ordinary (usual) knotted objects in 3D — braids, knots, links, tangles, knotted graphs, etc.	Virtual knotted objects — “algebraic” knotted objects, or “not specifically embedded” knotted objects; knots drawn on a surface, modulo stabilization.	Ribbon knotted objects in 4D; “flying rings”. Like v, but also with “overcrossings commute”.
Combinatorics	Chord diagrams and Jacobi diagrams, modulo $6T$, STU , IHX , etc.	Arrow diagrams and v-Jacobi diagrams, modulo $6T$ and various “directed” $STUs$ and $IHXs$, etc.	Like v, but also with “tails commute”. Only “two in one out” internal vertices.
Low Algebra	Finite dimensional metrized Lie algebras, representations, and associated spaces.	Finite dimensional Lie bi-algebras, representations, and associated spaces.	Finite dimensional co-commutative Lie bi-algebras (i.e., $\mathfrak{g} \ltimes \mathfrak{g}$), representations, and associated spaces.
High Algebra	The Drinfel’d theory of associators.	Likely, quantum groups and the Etingof-Kazhdan theory of quantization of Lie bi-algebras.	The Kashiwara-Vergne-Alekseev-Torossian theory of convolutions on Lie groups and Lie algebras.

Also put “Beauty not cracks” image.