ωεβ:=http://drorbn.net/ktc28

The Strongest Genuinely Computable Knot Invariant Since In 2024

The First International On-line Knot Theory Congress

February 1-5, 2025

Dror Bar-Natan

Abstract. "Genuinely computable" means we have computed it for random knots with over 300 crossings. "Strongest" means it separates prime knots with up to 15 crossings better than the less-computable HOMFLY-PT and Khovanov homology taken together. And hey, it's also meaningful and fun. Continues Rozansky, Garoufalidis, Kricker, and Ohtsuki, joint with van der Veen.

These slides and the code within are online at $\omega\epsilon\beta$:=http://drorbn.net/ktc25

(I wish all speakers were making their slides available before / for their talks).

- (I'll post the video there too)
- A paper-in-progress is at $\omega\epsilon\beta/Theta.$
- If you can, please turn your video on!

ωεβ:=http://drorbn.net/ktc25



Lou Kauffman at MSRI, March 1991

The Strongest Genuinely Computable Knot

Invariant Since In 2024

Strongest? Genuinely Computable?

Here's Θ

Genuinely Computable.

law persists.

invariant, that's science fiction.

on a random 300 crossing knot (from [DHOEBL]). For almost every other knot

Gukov: Should take 300 years if Moore's

Us: A few hours on a laptop, 0 GPUs.

Acknowledgement.

This work was supported by NSERC grant RGPIN-2018-04350 and by the Chu

Family Foundation (NYC).

ωεβ:=http://drorbn.net/ktc25

ωeβ:=http://drorbn.net/ktc25

ωεβ:=http://drorbn.net/ktc25

Strongest.

Testing $\Theta = (\Delta, \theta)$ on prime knots up to mirrors and reversals, counting the number of distinct values (with deficits in parenthesis): (ρ_1 : [Ro1, Ro2, Ro3, Ov, BV1])

		knots	(<i>H</i> , <i>Kh</i>)	(Δ, ρ_1)	$\Theta = (\Delta, \theta)$	(Δ, θ, ρ_2)	all togethe
	reign		2005-22	2022-24	2024	2025-	
	$xing \leq 10$	249	248 (1)	249 (0)	249 (0)	249(0)	249 (0)
	$xing \leq 11$	801	771 (30)	787 (14)	798 (3)	798 (3)	798 (3)
	$xing \le 12$	2,977	(214)	(95)	(19)	(10)	(10)
	$xing \leq 13$	12,965	(1,771)	(959)	(194)	(169)	(169)
	$xing \leq 14$	59,937	(10,788)	(6,253)	(1,118)	(982)	(981)
	$xing \le 15$	313,230	(70,245)	(42,914)	(6,758)	(6,341)	(6,337)

ωεβ:=http://drorbn.net/ktc25



Fun. There's so much more to see in 2D pictures than in 1D ones! Yet almost nothing of the patterns you see we know how to prove. We'll have fun with that over the next few years. Would you join?



Video and more at http://www.math.toronto.edu/~drorbn/Talks/KnotTheoryCongress-2502.