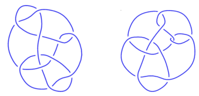
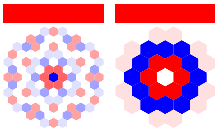
The Conway and Kinoshita-Terasaka Knots



```
GraphicsRow[PolyPlot[Θ[Knot[#]], ImageSize → Tiny] & /@
  {"K11n34", "K11n42"}]
```



(Note that the genus of the Conway knot appears to be bigger than the genus of Kinoshita-Terasaka)

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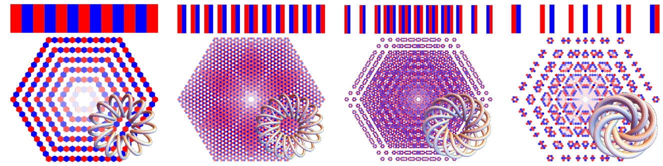
The Torus Knots $TK_{13/2}$, $TK_{17/3}$, $TK_{13,5}$, and $TK_{7,6}$

```
GraphicsRow[ImageCompose[
    PolyPlot[Θ[TorusKnot @@ #], ImageSize → 480],
    TubePlot[TorusKnot @@ #, ImageSize → 240],
    {Right, Bottom}, {Right, Bottom}
  ] & /@ {{13, 2}, {17, 3}, {13, 5}, {7, 6}}]
```



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Questions, Conjectures, Expectations, Dreams.

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Question 1.

What's the relationship between Θ and the Garoufalidis-Kashaev invariants [GK, GL]?

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Conjecture 2.

On classical (non-virtual) knots, θ always has hexagonal (D_6) symmetry.

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Conjecture 3.

θ is the ϵ^1 contribution to the "solvable approximation" of the sl_3 universal invariant, obtained by running the quantization machinery on the double $\mathcal{D}(\mathfrak{b}, b, \epsilon\delta)$, where $\mathfrak{b}$ is the Borel subalgebra of sl_3, b is the bracket of $\mathfrak{b}$, and δ the cobracket. See [BV2, BN1, Sch]

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Conjecture 4.

θ is equal to the "two-loop contribution to the Kontsevich Integral", as studied by Garoufalidis, Rozansky, Kricker, and in great detail by Ohtsuki [GR, Ro1, Ro2, Ro3, Kr, Oh].

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Fact 5. θ has a perturbed Gaussian integral formula, with integration carried out over a space $6E$, consisting of 6 copies of the space of edges of a knot diagram D. See [BN2].

Conjecture 6. For any knot K, its genus $g(K)$ is bounded by the T_1-degree of θ: $2g(K) \geq \deg_{T_1} \theta(K)$.

Conjecture 7. $\theta(K)$ has another perturbed Gaussian integral formula, with integration carried out over over the space $6H_1$, consisting of 6 copies of $H_1(\Sigma)$, where Σ is a Seifert surface for K.

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