

M. Khovanov

The Khovanov–Rozansky Complex

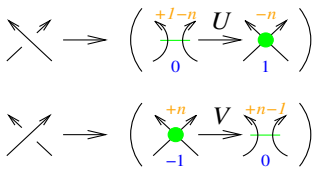
L. Rozansky



Dror Bar–Natan at UIUC, March 11, 2004, http://www.math.toronto.edu/~drorbn/Talks/UIUC–050311/

Crossings.

(height in blue)



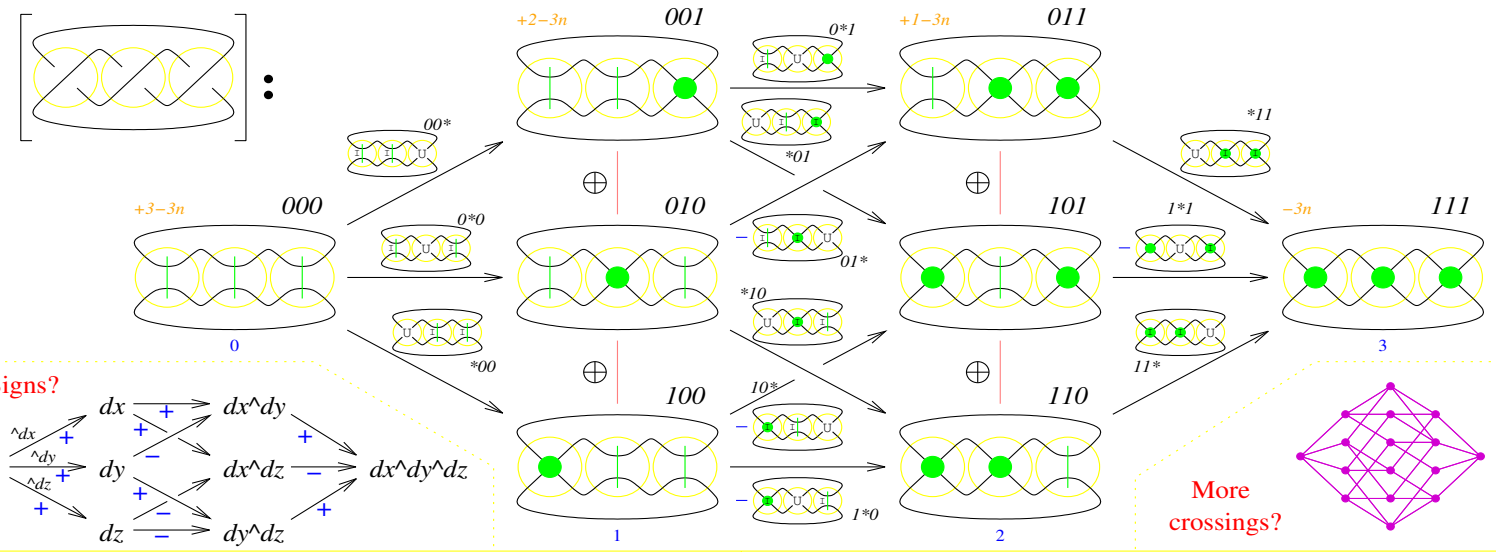
In[12]:=

$$U = \begin{pmatrix} x_4 - x_2 & 0 & 0 & 0 \\ \frac{u_1 + x_4\, u_2 - \pi_{2,3}}{x_1 - x_4} & 1 & 0 & 0 \\ 0 & 0 & x_4 & -x_2 \\ 0 & 0 & -1 & 1 \end{pmatrix}; \quad V = \begin{pmatrix} 1 & 0 & 0 & 0 \\ \frac{u_1 + x_1\, u_2 - \pi_{2,3}}{x_4 - x_1} & x_1 - x_3 & 0 & 0 \\ 0 & 0 & 1 & x_3 \\ 0 & 0 & 1 & x_1 \end{pmatrix};$$

```
Simplify[{U.P == Q.U, V.Q == P.V}]
```

Out[12]=

```
{True, True}
```



Signs?

More crossings?

Why am I happy?

1. The ugly formulas for L, Q, U, V; from where they come?
2. Where is the relationship with gl(n), representations and intertwiners?
3. Can you take the Euler characteristic before taking homology?
4. Is this computable?

"God created the knots, all else in topology is the work of mortals."

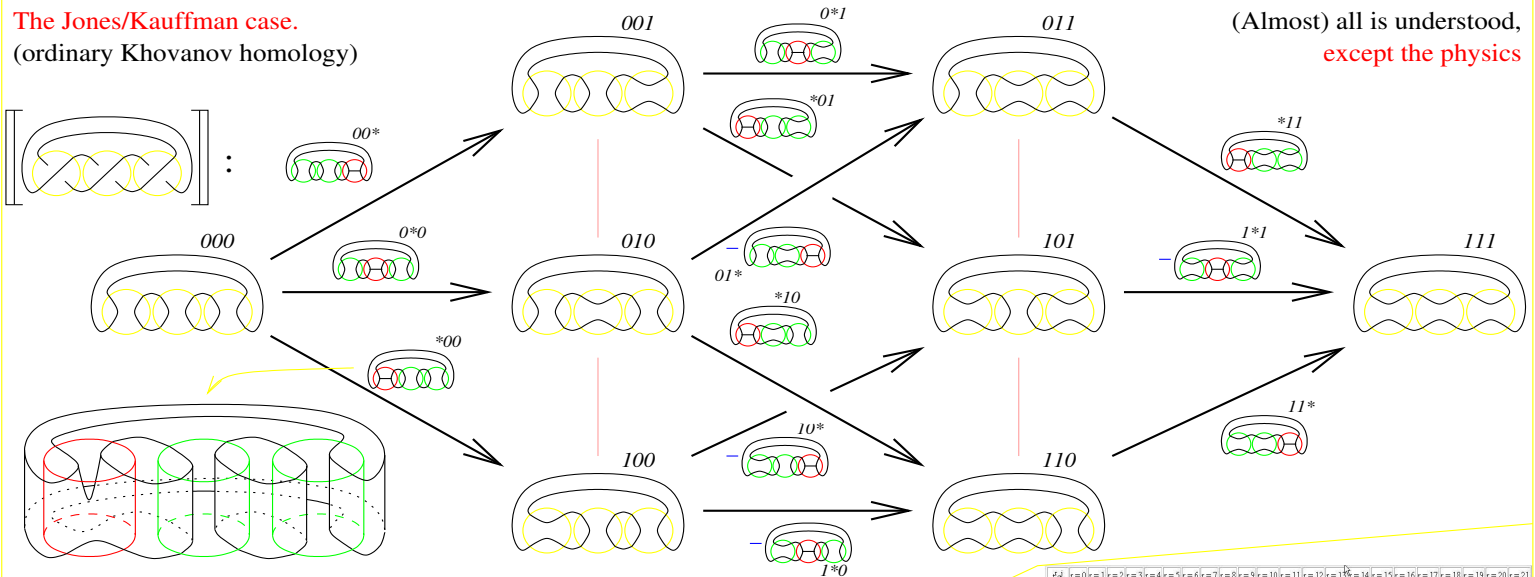
Leopold Kronecker (modified)



The Jones/Kauffman case.

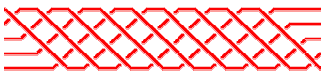
(ordinary Khovanov homology)

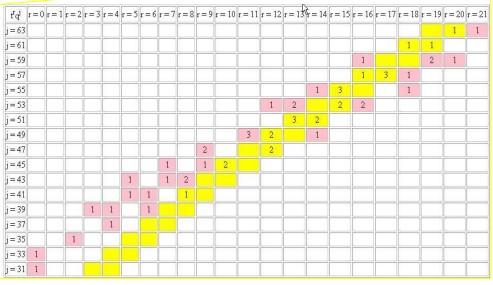
(Almost) all is understood, except the physics



See my paper "Khovanov homology for tangles and cobordisms",
http://www.math.toronto.edu/~drorbn/papers/Cobordism/

A computation example:





More at http://www.math.toronto.edu/~drorbn/Talks/UIUC-050311/