Abstract. I will describe a semi-rigorous reduction to combinatorics of perturbative BF theory (Cattaneo-Rossi [CR]), in the case of ribbon 2-links. Also, I will explain how and why my approach may or may not work in the non-ribbon case. Weak this result is, and at least partially already known (Watanabe [W]), yet in the ribbon case, the resulting invariant is a universal finite-type invariant, a gadget that significantly generalizes and clarifies the Alexander polynomial and that is closely related to the Kashiwara-Vergne problem. I cannot rule out the possibility that the corresponding gadget in the non-ribbon case will be as interesting.

BF Following [CR]. $A \in \Omega^2(M = \mathbb{R}^4, g), B \in \Omega^2(M, g)$.

$$S(A, B, f) := \int_{S^1} (B, F_A, f)$$

With $f : (S^2 = \mathbb{R}^2) \to M, \xi \in \Omega^2(M, g), \beta \in \Omega^2(S^2, g)$, set

$$i(A, B, f) := \int_{S^2} \exp\left(\int_{S^1} (\xi, df, \beta) + f F_A\right)$$

Deckers Sets (2D Gauss Codes).

A Partial Reduction of BF Theory to Combinatorics, 1

The BF Feynman Rules. For an edge $e$, let $B_n(e)$ be its delta invariants $S^1 \times S^1$. Let $i_0$ be the vertex form $\Omega^n(S^2, g)$.

Invariant in $C(W(T)) \to C(W(T))$, “cyclic words in $T$.”

Thinking: 1. could many sums combining to the terms on the right?
2. Invariant proof?

Partial Reduction of BF Theory to Combinatorics, 2

Musings

Of any ribbon 2-knot/link can be computed as knaps, and the result agrees with BN-Dunne [BND] and with Gom.!
Add an explicit calculation?

A. easier highlighting the combinatorial construction, perhaps as a "splash opener". Fatshasts:

0. Invariant of tangles, variants on braids. 
1. Contains Alexander.
2. The "missing factor" in Levine factorization
   [The rest of Levine's factorization can also
generally described in similar terms, hence 3
controls the MVA.]
3. should be "summed" [intertwined in gap theory] and categorified.