Please make an appointment with me for time and date for the oral exam, if you want to have one. This week!

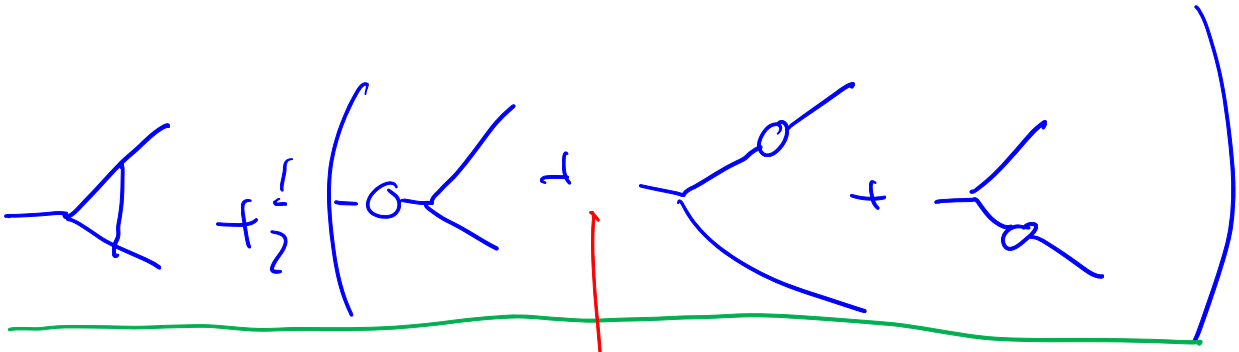
Afterwards, register with AGNES to the Prüfungsbüro.

Today: a few remarks on Dim Reg and the Riemann-Hilbert problem.

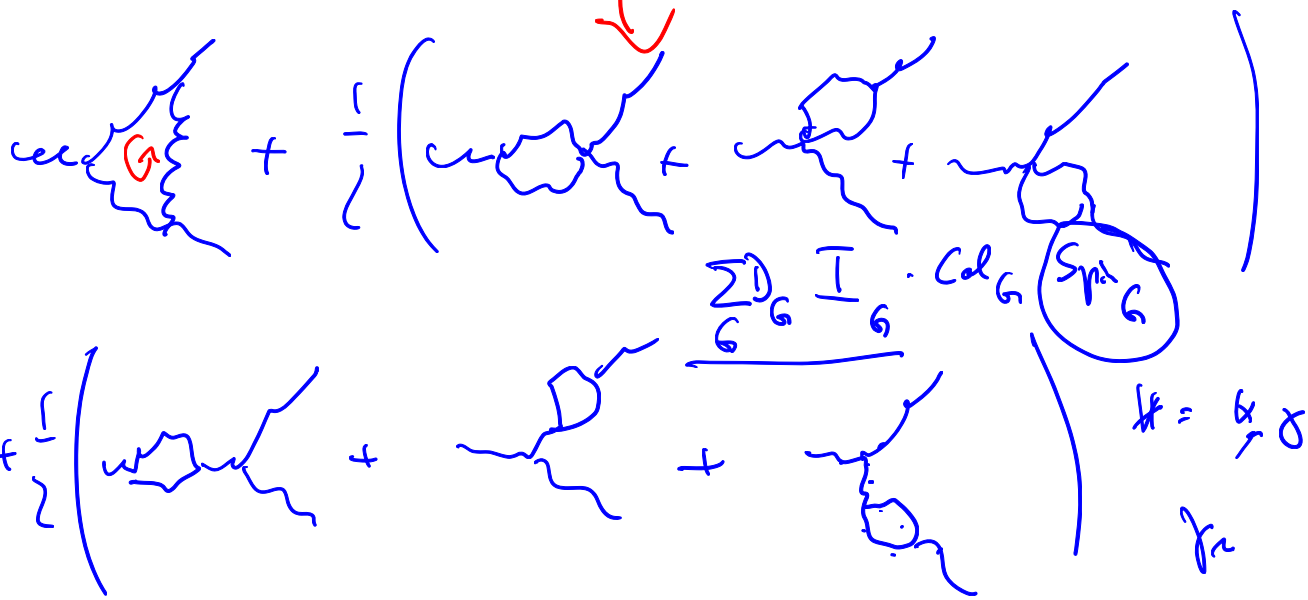
Then: corolla polynomial and its role in quantization of gauge theories.

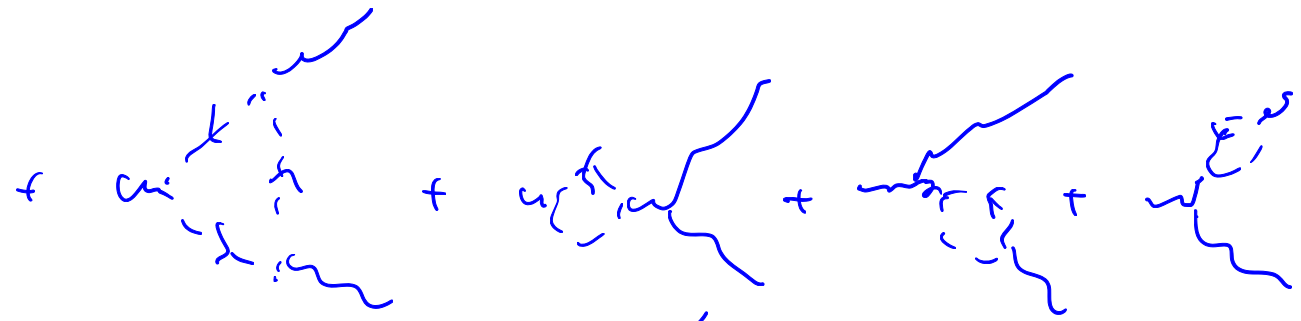
Now: towards the Corolla polynomial.

Connected graphs for 1-loop vertex in ϕ^3_6.



Y-M + fermionic matter





(+ sum over orientations)

You have Slavnov - Taylor id's "constituting a co-ideal in the Hopf algebra"

"Contraction with longitudinal degrees of freedom do not contribute to physics"

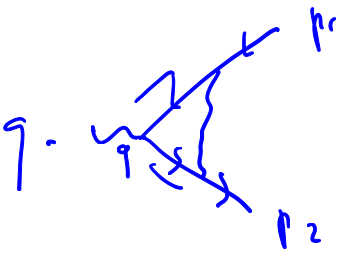
"Internal unphysical degrees of freedom drop out".

Both phenomena relate to graph cohomology.

i) In graph (co)homology you shrink internal edges. "S" $S \circ S = 0$

ii) In cycle homology, you mark closed loops. T $T \circ T = 0$

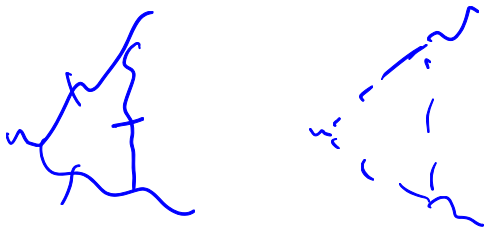
i)



$q^\mu \gamma_\mu \equiv \not{q}$

$\not{q} = \not{p}_1 + \not{\ell} - (\not{p}_2 + \not{\ell})$

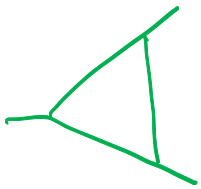
$\not{q} = \not{p}_1 - \not{p}_2$



$(S+T)\circ(S+T) = 0$

$$\{S, T\} = 0$$

$$S^2 = 0$$



3-regular graph in ϕ^3_6

actually, sum of all connected graphs with fixed loop number.

Wanted: a polynomial, which maps these integrands to the full gauge theory connected amplitude.

Start with polynomial on half-edges.

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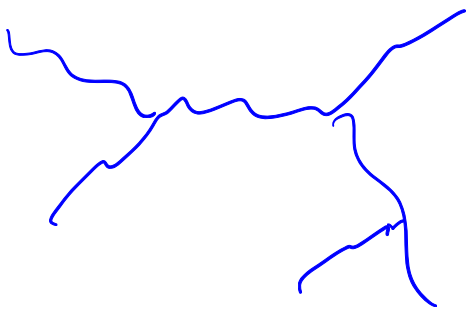
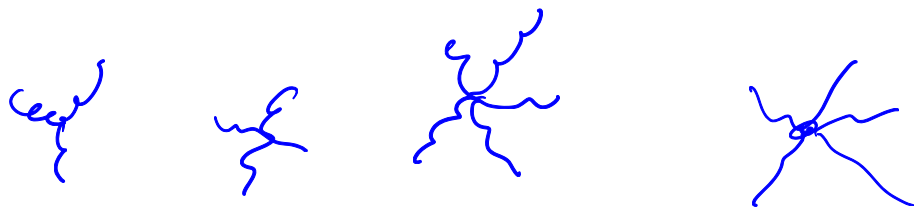
jump to QG.



spin 2

$\to$



vertices of any valence

renormalization Hopf alg. $\equiv$
as the core Hopf algebra.