

Local loop-level recursion for nonplanar theories

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SAGEX

Scattering Amplitudes:
from Geometry to Experiment



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Background

Ingrid Angélica Vazquez Holm from Norway



Background

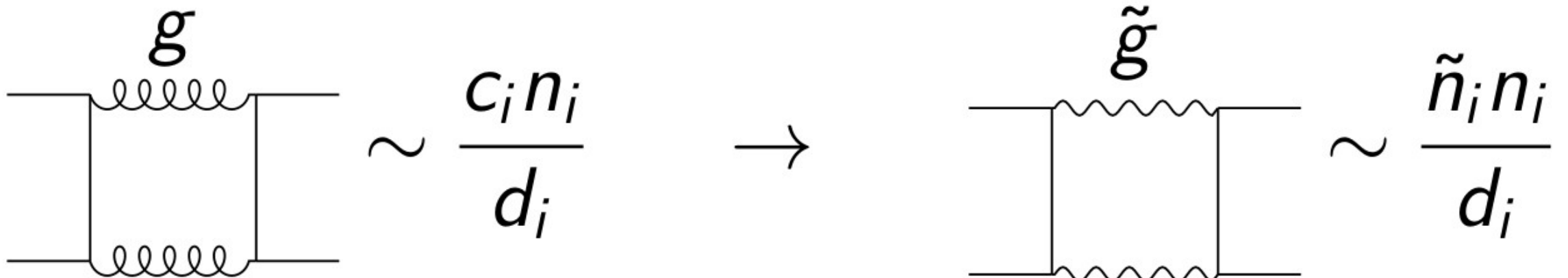
Ingrid Angélica Vazquez Holm from Norway

Master's in Theoretical Physics at the University of Oslo
Gaussian Processes for Supersymmetric cross sections



Local loop-level recursion for nonplanar theories

Recursion relations at loop level for gravity theories (using color kinematics)



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Recursion relations at loop level for gravity theories (using color kinematics)

Already accomplished: Amplitude dressing for 4-point massive scalars at 1-loop in QCD that satisfies color kinematics

The diagram illustrates a local recursion relation for a 4-point amplitude at the one-loop level. On the left, a square loop diagram with two external lines on the left and two on the right. The top and bottom edges of the loop are represented by curly lines, labeled with the coupling constant g . This diagram is shown to be approximately equal to the fraction $\frac{c_i n_i}{d_i}$. An arrow points to the right, where the same square loop diagram is shown, but the top and bottom edges are represented by wavy lines, labeled with the coupling constant g_{gh} . This diagram is shown to be approximately equal to the fraction $\frac{\tilde{n}_i n_i}{d_i}$.

$$\text{Diagram with curly lines } g \sim \frac{c_i n_i}{d_i} \rightarrow \text{Diagram with wavy lines } g_{\text{gh}} \sim \frac{\tilde{n}_i n_i}{d_i}$$

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Recursion relations at loop level for gravity theories (using color kinematics)

Already accomplished: Amplitude dressing for 4-point massive scalars at 1-loop in QCD that satisfies color kinematics

In progress: Amplitude dressing for massive scalars with an emitted gluon, to model binary black holes with gravitational radiation

The diagram illustrates a transition between two loop-level amplitudes. On the left, a planar loop diagram with two external lines and two internal wavy lines is labeled with a bold g above it. This is followed by a tilde symbol and the fraction $\frac{c_i n_i}{d_i}$. An arrow points to the right, where a non-planar loop diagram with two external lines and two internal wavy lines is labeled with a bold g above it. This is followed by a tilde symbol and the fraction $\frac{\tilde{n}_i n_i}{d_i}$.

$$\text{Planar Loop} \sim \frac{c_i n_i}{d_i} \rightarrow \text{Non-planar Loop} \sim \frac{\tilde{n}_i n_i}{d_i}$$

Interactions

ESR's at Network events, schools and conferences, and on Whatsapp

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Young Researcher Committee meetings and exhibition meetings

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Other network members at events and conferences

Training and secondment

Training

Solvay Institutes Brussels-Paris-Amsterdam-Geneva Doctoral School in
Quantum Field Theory, Strings and Gravity

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SAGEx DESY Summer School in *Gauge and String Theory*

SAGEx Soft Skills and Outreach training in Durham and DESY

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Wolfram

October-December 2020, developement of new functions and algorithms related to symbolic integration in Mathematica.

Outreach

Twitter account March-April 2019

Outreach

Twitter account March-April 2019

SAGEx exhibition planning

Outreach

Twitter account March-April 2019

SAGEx exhibition planning

Video project with Ekaterina Eremenko

Future plans

A PhD in Theoretical Physics, and work experience from Wolfram

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Presentation and communication skills

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Postdoctoral appointment after SAGEx

Thank you for your attention!