FROM AMPLITUDES TO THE DILATATION OPERATOR IN $\mathcal{N} = 4$ SYM

Stefano De Angelis

Supervisors: Prof. Andreas Brandhuber and Prof. Gabriele Travaglini

Mentor: Prof. Matthias Staudacher

SAGEX
Scattering Amplitudes:
from Geometry to Experiment

Queen Mary
University of London

CORRECTIONS TO THE VACUA OF BROKEN $\mathcal{N} = 4$ SUGRAS

Supervisor: Prof. Gianguido Dall'Agata

$\mathcal{N} = 4$ and $\mathcal{N} = 8$ SUGRAs divergences are studied in ungauged theories

Ungauged SUGRAs

1. NO scalar potential
2. NO (super)symmetry breaking
3. Minkowski vacua

Gauged SUGRAs

1. Non-trivial scalar potential
2. Partial/Complete SUSY breaking
3. Global symmetry breaking
4. (A)dS and Minkowski vacua

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DI PADOVA

FORM FACTORS AND THE DILATATION OPERATOR

Complete Form Factors in Yang-Mills Theories from Unitarity and Spinor Helicity in Six-Dimensions

arXiv:1910.04772 [hep-th], M. Accettulli Huber, A. Brandhuber, SDA, G. Travaglini

$$\mathcal{A}^{(L)}_{(d_s,d)} = \mathcal{A}^{(L)}_{(d_0,d)} + \sum_{m=0}^{L-1} \sum_{n=1}^{L-m} (d_s - d_0)^n (d_s - d_0 - 1)^m \mathcal{A}^{S\,(L)}_{(d_0,d,n,m)}$$

And the Dilatation Operator?

Form Factors, Scattering Amplitudes and the Dilatation Operator are strictly linked quantities:

$$e^{-i\pi D} F^* = S F^*$$

arXiv:1607.06448 [hep-th]

SYMBOLIC INTEGRATION ALGORITHMS IN MATHEMATICA

I will join the the Algorithms R&D department for a 3-month educational project at Wolfram Research in Champaign, Illinois. My start date will be March 16, 2020 and your end date will be June 16, 2020
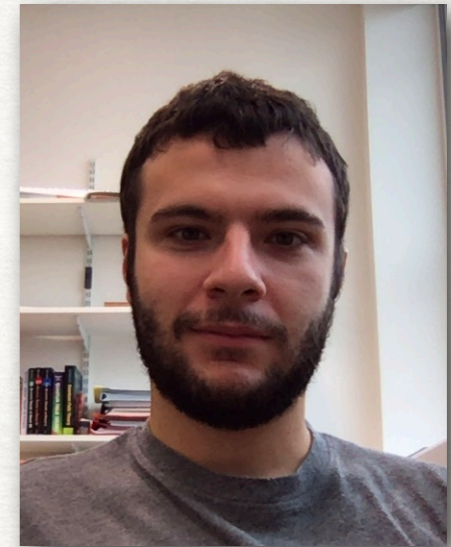
We will be mentored by Devendra Kapadia, Manager of Calculus and Algebra

I will assist with the development of new functions and algorithms related to SYMBOLIC INTEGRATION in Mathematica.

TRAINING

SAGEX

1. ESR Welcome meeting, Durham (April 1-2,2019)
2. Amplitudes conference, Dublin (July 1-5, 2019)
3. DESY Summer School in "Gauge and String Theory", Hamburg (July 22-26, 2019)

QMUL

5. Local Journal Clubs and Seminars
6. Local Graduate Lectures
7. Course in Intersection Theory, Padova (September 16-18, 2019)

OUTREACH

SAGEX

1. Twitter (with Manuel A. H.)
2. Organisation of the group exhibition in collaboration with Milde Marketing (with all ESRs)
3. 1st SAGEX Scientific Workshop, DESY Hamburg (July 29-August 2, 2019)

QMUL

4. "Hands-on Engagement" course
5. English courses during the first year