SEMPARIS – Séminaires en région parisienne

`http ://string.lpthe.jussieu.fr/semparis/`

Cours

Vendredi 31 Mars 2017, 10 :00
IPHT, Salle Claude Itzykson, Bât. 774(https ://courses.ipht.cnrs.fr/ ?q=fr/node/166)
Domaines : astro-ph—hep-th

Titre : *Graphical insights, with applications from QCD to cosmology (6/6)*

Orateur : **John Joseph Carrasco (IPhT)**

Résumé : *Graphs, at their most abstract, provide a language for describing relationships, one which has long been beneficial for the program of physical prediction. Combined with the Wilsonian understanding of effective field theory, perturbative analysis finds a role in predictions relevant to all scales, from processes describing the scattering of primordial gravitons, to QCD interactions at CERN's Large Hadron Collider, to establishing the astrophysical in-spiral and consequent post-merger ringing out of black holes, to the evolution of the largest scales cosmologically conceivable. Modern advances in scattering amplitude calculation have reemphasized the role of graphical organization towards efficient prediction, generalizing away from brute Feynman calculation, but yielding structural insights suggestive of a new type of unification touching predictions relevant to all of these scales.*

In these lectures I will talk about graphical organization of perturbative prediction, emphasizing scattering amplitudes, but with an eye towards generalization.

- GENERALIZED UNITARITY METHODS. How verification can be inverted towards construction. 1 lecture.

- COLOR-KINEMATICS ("BCJ") DUALITY AND ASSOCIATED DOUBLE-COPY. Exploring both computational advantages as well as unifying structure exposed. Relevant theories include : Chiral Pions, Yang-Mills, QCD, Born-Infeld, Volkov-Akulov, Galileons, Einstein-Hilbert Gravity, Open and Closed string theories. 2 lectures.

- QCD. Generalizations particularly relevant to QCD calculations (massive, non-adjoint representations). 1 lecture.

- GRAVITY/COSMOLOGY. Application of some of these ideas to astrophysical and cosmological classical solutions in gravity. 2 lectures.