

# Infrared Structure of Perturbative Gauge Theories

This course gives a general introduction to the problem of infrared and collinear singularities in perturbative gauge theories, explaining our current understanding and pointing to several applications. The goals are to introduce modern techniques to explore perturbative quantum field theory to all orders, in particular in the low-energy, long-distance regime. The techniques to be explored find important phenomenological applications in perturbative QCD, since they underlie factorization theorems, and they lead to the development of resummation techniques, which significantly extend the range of applicability of perturbation theory for a number of important LHC observables. The all-order knowledge of infrared effects also finds application in more formal studies of quantum field theory, imposing constraints on scattering amplitudes in widely studied models such as N=4 Super Yang-Mills theory. Students of the course are expected to become knowledgeable on the state of the art in the field, and will be brought to the level of developing their own research applications.

<b>Dates</b>	04 December -13 December, 2017								
<b>Host Institution</b>	Indian Institute of Technology Hyderabad								
<b>Topics</b>	<ul style="list-style-type: none"> <li>■ Introduction to all-order techniques for Feynman diagrams</li> <li>■ Soft and collinear diagrammatics</li> <li>■ Relationship between factorization, evolutions and resummation</li> <li>■ Dipole formula and its violations at 3-loops and beyond</li> <li>■ Applications to planar N=4 SYM theory and BDS Ansatz</li> <li>■ Techniques to compute <i>webs</i> for the soft function</li> </ul>								
<b>You should attend if you are a</b>	<ul style="list-style-type: none"> <li>■ Ph.D student in the area of theoretical High Energy Physics</li> <li>■ Postdoctoral Fellow in High Energy Physics</li> <li>■ Senior researcher from universities or national institutes interested in the specialized topics offered in this course</li> </ul>								
<b>Fees</b>	<p>The participation fees for taking the course is as follows:</p> <table style="width: 100%; border: none;"> <tr> <td><b>Ph.D. Students</b></td> <td style="text-align: right;"><b>Rs. 2000.00</b></td> </tr> <tr> <td><b>Postdoctoral Fellows</b></td> <td style="text-align: right;"><b>Rs. 3000.00</b></td> </tr> <tr> <td><b>Faculty from Academic Institutions</b></td> <td style="text-align: right;"><b>Rs. 5000.00</b></td> </tr> <tr> <td><b>Participants from Abroad</b></td> <td style="text-align: right;"><b>US \$ 100.00</b></td> </tr> </table> <p>The above fee includes all instructional materials. The fees will be half of the above mentioned for SC/ST students.</p>	<b>Ph.D. Students</b>	<b>Rs. 2000.00</b>	<b>Postdoctoral Fellows</b>	<b>Rs. 3000.00</b>	<b>Faculty from Academic Institutions</b>	<b>Rs. 5000.00</b>	<b>Participants from Abroad</b>	<b>US \$ 100.00</b>
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<b>Participants from Abroad</b>	<b>US \$ 100.00</b>								
<b>Accommodation</b>	The participants who opt for accommodation in IITH will be provided the same at the IITH guest house/hostels on payment basis.								

## The Faculty



**Prof. Lorenzo Magnea**

**Professor of Theoretical Physics,**

**University of Torino.**

Research Interests: Particle Physics and QCD

Prof. Lorenzo Magnea is an internationally renowned expert in the area of high energy physics and Quantum Chromodynamics. He received his Ph.D. from Stony Brook University and held postdoctoral positions at Cornell University and Nordita. He is currently Professor of Theoretical Physics and Head of the Theory Group at the department of Physics of the University of Torino.



**Dr. Neelima Agarwal**

**Assistant Professor of Physics**

**CBIT, Hyderabad**

Research Interests: High Energy Physics and

Quantum Chromodynamics



**Dr. Anurag Tripathi**

**Assistant Professor of Physics**

**IIT, Hyderabad**

ResearchInterests:High Energy Physics

Quantum Chromodynamics

## Course Co-ordinator

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