# SEMPARIS – Séminaires en région parisienne

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## Particle Physics Seminars at IJCLab

**Lundi 15 Juillet 2024, 14 :00**
IJCLAB, 100/2-A201 - Salle A201 (IJCLab)( https ://indico.ijclab.in2p3.fr/event/10756/ )
Domaines : hep-ph

Titre : *Advancing Soft QCD Understanding : Revisiting Multi-Pomeron Exchange in String Models with U-Matrix Solutions*

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Résumé : *Multi-pomeron exchange in string models is crucial for understanding soft QCD processes, which occur at low momentum transfer where non-perturbative effects dominate. These effective string models, which combine fundamental principles of quantum field theory, such as unitarity, with empirical parameterizations, employ the eikonal approximation to satisfy the unitarity principle. However, it has been demonstrated through direct and indirect evidence that the utilized eikonal or its enhanced version, the quasi-eikonal scheme, is insufficient for a complete description of the physics in question. Moreover, there are fundamental issues with string models that need to be addressed. In string models, elementary interactions (pomerons) are identified from Gribov-Regge theory with pairs of strings, using the probability for n pomerons as the probability for configurations with n string pairs. Unfortunately, this approach is inconsistent for two main reasons :*

*1) In the string picture, the first and subsequent pairs are of different nature, whereas in the Gribov-Regge model, all pomerons are identical. 2) In the string model, energy is properly shared among the strings, while the Gribov-Regge approach does not consider energy sharing at all.*

*In this talk, I will present the uncertainties in modelling hadronic observables at LHC and cosmic-ray energy ranges when considering alternative schemes, namely the U-matrix. I will provide an explanation of the fundamental nature of pomeron exchange within the U-matrix scheme in comparison to the eikonal scheme, despite both schemes adhering to the unitarity constraint principle. I will discuss how the U-matrix scheme is more adequate for describing interactions of composite particles like hadrons and highlight* *how this approach may provide solutions to the fundamental issues within string models, enhancing our understanding of soft QCD processes and offering a more consistent framework for modelling hadronic interactions.*