

# SEMPARIS – Séminaires en région parisienne

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## Séminaire informel

**Jeudi 12 Octobre 2017, 13 :00**

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Domaines : hep-th

Titre : *Analyticities of Scattering Amplitudes*

Orateur : **Jnanadeva Maharana ( Institute of Physics, Bhubaneswar, India )**

Résumé : *The properties of the high energy behavior of the scattering amplitude of massive, neutral and spinless particles in higher dimensional field theories are investigated. The axiomatic formulation of Lehmann, Symanzik and Zimmermann is adopted. The analyticity properties of the causal, the retarded and the advanced functions associated with the four point elastic amplitudes are studied. The analog of the Lehmann-Jost-Dyson representation is obtained in higher dimensional field theories. The generalized J-L-D representation is utilized to derive the  $t$ -plane analyticity property of the amplitude. The existence of an ellipse analogous to the Lehmann ellipse is demonstrated. Thus a fixed- $t$  dispersion relation can be written down with finite number of subtractions due to the temperedness of the amplitudes. The domain of analyticity of scattering amplitude in  $s$  and  $t$  variables is extended by imposing unitarity constraints. A generalized version of Martin's theorem is derived to prove the existence of such a domain in  $D$ -dimensional field theories. It is shown that the amplitude can be expanded in a power series in  $t$  which converges for  $-t-jR$ ;  $R$  being  $s$ -independent. The positivity properties of absorptive amplitudes are derived to prove the  $t$ -plane analyticity of amplitude. In the extended analyticity domain dispersion relations are written with two subtractions. The bound on the total cross section is derived from LSZ axioms without any extra ad hoc assumptions.*

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