

*Organisé conjointement par  
CPHT-École Polytechnique et Groupe Théorie IPN Orsay*

## **SÉMINAIRE de PHYSIQUE des PARTICULES**

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### **The power of Effective Field Theory: Deriving the electroweak Standard Model**

**Résumé :**

In this talk, I revisit the problem of deriving local gauge invariance with spontaneous symmetry breaking in the context of an Effective Field Theory (EFT). Previous derivations were based on the condition of tree-order unitarity. However, the modern point of view considers the Standard Model as the leading order approximation to an EFT. As tree-order unitarity is in any case violated by higher-order terms in an effective field theory, it is instructive to investigate a formalism which can be also applied to analyze higher-order interactions. For that, I consider an effective field theory of massive vector bosons interacting with a massive scalar field. Imposing a number of physical conditions and requiring perturbative renormalizability as well as scale separation lets one recover the gauge-invariant Lagrangian with spontaneous symmetry breaking taken in the unitary gauge as the leading order approximation to an EFT. The implementation of electromagnetism is also touched upon. Finally, I outline the additional work that is required to finish this program.

**Jeudi 16 Mai 2019**

**11:00**

**Salle A015**