**PhD Physics course at Bari University (XXXII Cycle)**

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| **Title** | Renormalization of field theories and the Renormalization Group |
| **Proponent** | Fulvia De FazioSenior ResearcherINFN Sezione di Bari |
| **# CFU****(1 CFU = 8 hours)** | 2 CFU (16 hours) |
| **Schedule** | To be agreed with the students on the basis of the other chosen courses |
| **Brief Summary of the course** | Renormalization of field theories will be treated in detail.The preliminary step of isolating divergences in the calculation of Feynman diagrams will be afforded through the dimensional regularization method.Interactions will be classified into renormalizable or not after the introduction of the concept of superficial degree of divergence for Feynman diagrams.Renormalization group functions and equations will be studied, in particular considering the behaviour of the solutions of the latter and the relation to asymptotic freedom in gauge theories. Reference to QED and QCD will be done throughout the whole course. |
| **Programme** | Introductory stepsDimensional regularizationRenormalizable InteractionsWard-Takayashi identitiesRenormalization and symmetrySlavnov-Taylor identitiesRenormalization Group (RG)RG equations in the MSbar schemeSolution of the ‘t Hooft Weinberg equation Beta function and asymptotic freedomAnomalous dimensions |
| **Recommended texts** | Peskin and Schroeder - Introduction to Quantum Field Theory T. Muta – Foundations of Quantum Chromodynamics |
| **Assessment methods** | Interview at the end of the course. |