Service de Physique de l'Univers, Champs et Gravitation

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Sujet de mémoire

Anomalies in quantum field theories

Anomalies is a subtle and remarkable phenomenon that takes place whenever no regularization can preserve a given classical symmetry of the action. There are different types of anomalies, e.g. chiral anomaly, trace anomaly and parity anomaly. Anomalies in global symmetries do not indicate an inconsistency, while anomalies in gauge symmetries must be avoided at any cost. The latter imposes severe restrictions on quantum field theories. In addition, anomalies are related to deep mathematical results on index theorems. The goal of the project is to get familiar with different types of anomalies and relation to index theorems.

Références

[1] *Anomalies in Quantum Field Theory* by Reinhold A. Bertlmann

[2] *Path Integrals and Quantum Anomalies* by Kazuo Fujikawa and Hiroshi Suzuki

[3] *Path Integrals and Anomalies in Curved Space* by Fiorenzo Bastianelli and Peter van Nieuwenhuizen

Prerequisites: "Théorie des groupes" S-PHYS-201, "Relativité générale" S-PHYS-053 and "Théorie quantique des champs I" S-PHYS-049

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