

Théorème de Bell

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Chapitre 1

Théorème de Bell

1.1 Introduction

Le théorème de Bell est l'un des résultats les plus profonds de la physique quantique. Il démontre que les corrélations quantiques ne peuvent pas être expliquées par des variables cachées locales.

1.2 Les inégalités de Bell

L'inégalité de Bell originale :

$$|E(a, b) - E(a, c)| \leq 1 + E(b, c) \quad (1.1)$$

où $E(a, b)$ est la corrélation entre les mesures avec les paramètres a et b .

1.3 Violation quantique

La mécanique quantique prédit :

$$E(a, b) = -\cos(\theta_{ab}) \quad (1.2)$$

Cette prédiction viole les inégalités de Bell pour certains angles.

title

La violation des inégalités de Bell prouve que :

- La réalité quantique est non-locale
- Les corrélations quantiques sont instantanées
- Les variables cachées locales sont impossibles

1.4 Perspective T0

Dans la théorie T0, la non-localité quantique est une propriété fondamentale du champ ξ :

$$\text{Non-localité} \leftrightarrow \text{Champ } \xi \text{ global} \quad (1.3)$$

Le champ ξ connecte instantanément tous les points de l'espace-temps.

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