Notes of Quantum Theory of Fields by S.Weinberg

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Contents

1 Historical Introduction

2 Relativistic Quantum Mechanics

2.1 Symmetries

If the observations of possible experiments of a system do not change under a transformation, then the transformation is defined to be *symmetry transformation*. Saying in another way, observations under symmetry transformation can be seen as different observers look at the *same* system, and they must find the same probabilities

$$P(\mathcal{R} \to \mathcal{R}_n) = P(\mathcal{R}' \to \mathcal{R}'_n) \tag{2.1}$$

This is the only condition for a transformation to be a symmetry.