Local Gauge Anomalies and The Standard Model

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I. INTRODUCTION

II. CLASSICAL FIELD THEORY & NOETHER'S THEOREM

III. PATH INTEGRAL & GENERATING FUNCTIONAL

Given a particle position x at time t the probability amplitude of a measurement at time t' observing a position x' is

$$\begin{aligned} M(x',t';x,t) &= {}_H\langle x',t'|x,t\rangle_H \\ &= \langle x'| \exp\left[\frac{-i}{\hbar}\hat{H}(t-t')\right]|x\rangle \end{aligned}$$

now we note that if the states are normalised

$$\int dy |y,t\rangle\langle y,t| = \mathbb{I} \tag{1}$$

we can write

$$M(x',t';x,t) = \sum_n \psi_n(x')\psi_n^*(x)\exp\left[\frac{-i}{\hbar}\hat{H}(t-t')\right] \tag{2}$$

which acts as our propagator

$$\psi(x',t') = \int dx\, M(x',t';x,t)\psi(x,t)\partial_\mu^x \tag{3}$$

IV. SCALAR FIELDS & GREEN'S FUNCTIONS

V. WESS-ZUMINO CONSISTENCY & WARD IDENTITY

VI. STORA-ZUMINO DESCENT

VII. DAI-FREED & INDEX THEOREMS