Notes for "GRAVITATION" - MTW

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I. INTRODUCTION

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II. RELATIVISTIC QUANTUM MECHANICS

A. Quantum Mechanics

B. Symmetries

1. "For this to be unitary and linear, t must be Hermitian and linear" (*P.*51)

Linearity is trivial and hermiticity follow from the following observation:

$$\begin{aligned}\langle U\Psi|U\Phi\rangle &= \langle(1+i\varepsilon t)\Psi|(1+i\varepsilon t)\Phi\rangle \\ &= \langle\Psi|\Phi\rangle + \varepsilon i\left(\langle\Psi|t\Phi\rangle - \langle t\Psi|\Phi\rangle\right) + \mathcal{O}\big(\varepsilon^2\big) \\ &\overset{Eq.\,(2.2.2)}{\Leftrightarrow} \langle\Psi|t\Phi\rangle = \langle t\Psi|\Phi\rangle \\ &\overset{Eq.\,(2.1.5)}{\Leftrightarrow} t^\dagger = t\end{aligned}$$

2. Eq. (2.2.19) (*P.*54)

f^a_{bc} and f^a have to be real as θ^a are real.

III. SCATTERING THEORY

A. "In" and "Out" States

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