CHAPTER 1

The Hoyle-Narlikar Theory

of Gravitation

1. Introduction

The success of Maxwell's equations has led to

electrodynamics being normally formulated in terms of fields that have degrees of freedom independent of the particles in them. However, Gauss suggested that an action-at-a-distance theory in which the action travelled at a finite velocity might be possible. This idea was developed by Wheeler and Feynman (1,2) who derived their theory from an action-principle that involved only direct interactions between pairs of particles. A feature of this theory was that the 'pseudo'-fields introduced are the half-retarded plus half-advanced fields claculated from the world-lines of the particles. However, Wheeler and Feynman, and, in a different way, Hogarth were able to show that, provided certain cosmological conditions were satisfied, these fields could combine to give the observed field. Hoyle and Narlikar (4) extended the theory to general space-times and obtained similar theories for their 'C'-fiela 5and for the gravitational field (6). It is with these theories that this chapter is concerned.

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[1] Written by Peter MOUEZA