SUPERLUMINAL EFFECTS AND TACHYON THEORY

FABIO CARDONE

Dipartimento di Fisica Universitá de L'Aquila, L'Aquila, Italy

ROBERTO MIGNANI

Dipartimento di Fisica "E. Amaldi," Universitá degli Studi "Roma Tre," Rome, Italy

CONTENTS

- I. Introduction: Extended Relativity
- II. Astrophysical Superluminal Expansions
- III. Are Neutrinos Tachyons?
- IV. Photon Tunneling and Evanescent Waves
- V. Superluminal Optical Propagation in Media with Anomalous Dispersion
- VI. X Waves
- VII. Do Superluminal Phenomena Violate Causality?

Acknowledgments

References

I. INTRODUCTION: EXTENDED RELATIVITY

The possible existence of faster-than-light objects has a long history, which, since the early 1900s, can be traced back in pre-relativistic times) to J. J. Thomson and A. Sommerfeld (see the excellent review in Ref. 1 by Recami for a full historical account). After the advent of special relativity in 1905, light speed (the speed of light) in vacuum was considered as the maximal causal speed, as an upper limit for any velocity. Such a common belief lasted for about half a century, when the problem of faster-than-light particles was reconsidered

Modern Nonlinear Optics, Part 3, Second Edition, Advances in Chemical Physics, Volume 119, Edited by Myron W. Evans. Series Editors I. Prigogine and Stuart A. Rice. ISBN 0-471-38932-3 © 2001 John Wiley & Sons, Inc.