

**RELATIVITY, GRAVITATION, and
RELATIVISTIC ROTATION:
Clarifying some paradoxes of relativity
at the extreme**

CONTENTS ONLY

INTERNET FILE

CONTENTS ONLY

INTERNET FILE

Netsivi Ben-Amots, D.Sc.

Published by
Technology Dynamics Inc. Bergenfield New-Jersey USA

**RELATIVITY, GRAVITATION, and RELATIVISTIC ROTATION:
Clarifying some paradoxes of relativity at the extreme**

Netsivi Ben-Amots

RELATIVITY, GRAVITATION, and RELATIVISTIC ROTATION:
Clarifying some paradoxes of relativity at the extreme

Netsivi Ben-Amots

P.O.Box 3193, Haifa 3103201, Israel

e-mails: nbenamots@yahoo.com

benamots@alumni.technion.ac.il

Author's internet site: <http://www.netsivi.org>

About the author: p. 441

Front cover: Figure 13 in Chapter 15, p. 324: Gravitational exponential potential $\exp(-1/r)$ compared to zero potential, by Netsivi Ben-Amots

Back cover: Figure 4 in Chapter 10, p. 178: Section through a torus-like ("doughnut"), rotating astronomical gravitational object (like a thick accretion disk), showing sections of surfaces according to *analytical* calculations, by Netsivi Ben-Amots

The book and the cover are copyright © 2017, 2018 by Netsivi Ben-Amots, Haifa, Israel.

All rights reserved. Printed in U.S.A.

Published by: **Technology Dynamics Inc.**, Bergenfield, NJ

Permission is granted by the author to copy up to few pages of the book

1. Only after the book is printed on paper, bounded and published, and
2. Only from its paper form in a paperback or bounded book to a paper form, and
3. With the following stipulations:
4. That it be for research purposes only, and
5. Not for any unlawful, damaging, commercial, profit, plagiarism, forgery or fraudulent purposes, and with
6. The inclusion of the author's name Netsivi Ben-Amots at the beginning of the copied/quoted material, and not erasing or omitting the author's name from any page, and
7. Only the person copying any part of the book, and his employer (if copied at work) will be responsible for any damage caused to anyone, by them or by anyone related to them (family or otherwise), or by anyone who copied from them, of any material from this book to computer/paper/book or paper pages, or to any other form/media, or by using the copied material by anyone.
8. The author and the publishing company will not be responsible for any damage caused by the copying or by reading/using the copied material or by reading or any other use of this book.

PART I: RELATIVISTIC ROTATION

PART II: OTHER RELATIVISTIC MOTIONS

PART III: RELATIVITY, GRAVITATION AND ELECTRIC CHARGE

PART IV: DISCUSSION, PREDICTIONS AND APPENDIXES

c47

CONTENTS SUMMARY (page numbers omitted in this internet file)

Contents summary

Detailed content

List of 57 figures

List of 14 tables

Overview

New explanations for some astronomical observations

Preface

PART I: RELATIVISTIC ROTATION

1. Relativistic rotation without angular acceleration
2. Relativistic mass and angular momentum of a rotating sphere
3. The centripetal force in relativistic rotations
4. Quark's spin arising from Franklin's relativistic rotation
5. Quark's spin as the possible energy source of quasars and AGNs
6. Non-equivalence between gravity and acceleration of rotation

PART II: SOME OTHER RELATIVISTIC MOTIONS

7. Star and galaxy travels
8. Relativistic radial expansion
9. Three dimensional relativistic velocities

PART III: RELATIVITY, GRAVITATION and ELECTRIC CHARGE

10. Gravitational collapse of a rotating fluid object
11. Observational measurements prove Einstein's general relativity
12. Einstein's general relativity near a rotating mass
13. Some line elements involving tanh not exhibiting black holes
14. Gravity with variable rest mass
15. Exponential gravitation – an exterior and interior solution without singularity
16. "Unlimited" loans of energy
17. Decreasing and increasing gravitational intensity
18. Cosmology hypotheses based on ideas presented in this book

PART IV: DISCUSSION, PREDICTIONS and APPENDIXES

19. Discussion and predictions
 - 19.1 The forbidden regions of general relativity
 - 19.2 **Predictions** and new ideas in this volume
 - 19.3 New stages on the way to gravitational collapse of celestial bodies
- APPENDIX A: Computer program of a numerical simulation of
Franklin's rotation of a sphere with uniform mass density
- APPENDIX B: Table of some useful physical constants
- APPENDIX C: Some relevant solved exercises
- Additional appendixes
- ADDENDUM: Some branches of relativity
- Name index
- Abbreviation index
- About the author

DETAILED CONTENTS (page numbers omitted in this internet file)

Contents summary

Detailed contents

List of figures

List of tables

Overview**New explanations for some astronomical observations**

N.1 Bounceback and energy of supernova

N.2 Why thick discs emit astrophysical jets

N.3 Energy source of quasars and active galaxies nuclei

N.4 No black hole

N.5 Structure and energy source of quasars, AGNs,
microquasars and relativistic astronomical jets

N.6 Distance-redshift dependence is non-linear

N.7 Dark matter includes baryons with zero spin

References for the new explanations

Preface

References to the preface

PART I: RELATIVISTIC ROTATION

1. Relativistic rotation without angular acceleration

Preface

Abstract

Notation

1-1 Introduction

1-2 The problem of relativistic rotation

1-3 Rapidity

1-4 Linear constant acceleration

1-5 Relativistic Franklin's rotation

1-6 The unique features of the Franklin rotation

1-7 Relativistic rigid rotation

1-8 Applications

1-9 Summary

1-10 Acknowledgements

References

2. Relativistic mass and angular momentum of a rotating sphere

Preface

Abstract

Notation

2-1 Introduction

2-2 Newtonian rotation of a sphere

2-3 Relativistic homogeneous sphere

2-4 Relativistic increase of mass and angular momentum under Newtonian rotation

2-5 Inadequacy of Newtonian rotation

2-6 Rosen's rotation

- 2-7 Franklin's rotation
- 2-8 Comparative evaluation of rotation models for homogeneous rest density spheres
- 2-9 Sphere with radially-varying density $\rho(r)$ at rest
- 2-10 A variation of Franklin's formulas
- 2-11 Summary
- 2-12 Acknowledgements
- References

- 3. The centripetal force in relativistic rotations
 - Preface
 - Abstract
 - Notation
 - 3-1 Introduction
 - 3-2 Centripetal force
 - 3-3 Newtonian rotation
 - 3-4 Rosen's relativistic rotation
 - 3-5 Relativistic Franklin's rotation
 - 3-6 Comparison of centripetal forces for various models of rotations
 - 3-7 Summary
 - 3-8 Acknowledgements
 - References

- 4. Quark's spin arising from Franklin's relativistic rotation
 - Preface
 - Abstract
 - Notation
 - 4-1 Introduction
 - 4-2 Equations
 - 4-3 The single quark as a rotating sphere
 - 4-4 Rest mass
 - 4-5 Limitations on the radius of a quark
 - 4-6 A rotating sphere with non-uniform rest density
 - 4-7 A non-uniform density quark
 - 4-8 Summary
 - References

- 5. Quark's spin as the possible energy source of quasars and AGNs
 - Preface
 - Abstract
 - Notation
 - 5-1 Introduction
 - 5-2 Mechanical model for a cluster of quarks
 - 5-2.1 Cluster of two quarks
 - 5-2.2 Cluster of three quarks
 - 5-2.3 Cluster of four quarks and more
 - 5-3 Behavior of ultra-condensed matter
 - 5-4 The structure of a massive contiguous celestial body

- 5-4.1 A stabilizing source of energy
 - 5-4.2 Buoyancy instability
 - 5-4.3 Energy production
 - 5-5 Stability
 - 5-6 Fields around the quarks
 - 5-7 Summary
 - References
6. Non-equivalence between gravity and acceleration of rotation
- Preface
 - Abstract
 - 6-1 Einstein's principle of equivalence
 - 6-2 Does acceleration caused by uniform rotation obey the principle of equivalence?
 - 6-3 The principle of equivalence does *not* include centrifugal acceleration!
 - 6-4 Symmetry
 - 6-5 Dragging the inertial frames
 - 6-6 Is it possible to measure an eventual rotation of the Universe?
 - 6-7 Conclusions
 - 6-8 Acknowledgements
 - References
 - Postscript

PART II: SOME OTHER RELATIVISTIC MOTIONS

7. Star and galaxy travels
- Abstract
 - Notation
 - 7-1 Linear constant acceleration
 - 7-2 Linear acceleration
 - 7-3 Calculations
 - 7-4 Advantages
 - 7-5 Energy limitations
 - 7-6 Force limitation
 - 7-7 Anti-collision control
 - 7-8 What does an observer measure from the launch place?
 - 7-9 Constant effective acceleration
 - 7-10 No time-travels
 - 7-11 Summary
 - 7-12 Acknowledgements
 - References
8. Relativistic radial expansion
- Preface
 - Abstract
 - Notation
 - 8-1 Introduction

- 8-2 Horizon in radial expansion
- 8-3 Rapidity
- 8-4 Radial expansion without horizon, which is our special-relativistic Hubble Law
- 8-5 Distances and redshift
- 8-6 Olbers's paradox
- 8-7 The "dark energy" hypothesis
- 8-8 Observed luminosity and magnitude
- 8-9 Radial acceleration
- 8-10 Comparing with concept and theory accepted up to now
 - 8-10.1 Pseudo line element
 - 8-10.2 Hubble constant
 - 8-10.3 Comparison with Friedmann equation, Robertson-Walker space
 - 8-10.4 Comparison with Milne Universe, special relativity theories
 - 8-10.5 Hubble constant, time independent or variable in time
 - 8-10.6 The age of the Universe
 - 8-10.7 Dark matter
 - 8-10.8 Alternative pycno-nuclear reactions
- 8-11 Summary of continuous expansion
- 8-12 The expanding front
- References

9. Three dimensional relativistic velocities

- Abstract
- Notation
- 9-1 Relativistic addition of velocities
- 9-2 Introduction
- 9-3 Adding velocities in Newtonian and in relativistic systems
 - 9-3.1 Adding three collinear velocities
 - 9-3.2 Adding two perpendicular velocities
 - 9-3.3 Adding three perpendicular velocities
- 9-4 Decomposing relativistic velocity into two perpendicular velocity components
- 9-5 Relativistic perpendicular addition in spherical coordinates
- 9-6 Energy
- 9-7 Rotation with Hubble radial expansion
- 9-8 An example: The mass of a sphere with uniform density rotating and moving linearly
- 9-9 Application: Moving elementary particle
- 9-10 A comment on adding velocities beyond the speed of light
- 9-11 Summary
- 9-12 Acknowledgements
- References

PART III: RELATIVITY, GRAVITATION and ELECTRIC CHARGE

10. Gravitational collapse of a rotating fluid object

- Preface
- Abstract
- Notation

- 10-1 Introduction
 - 10-2 Conservation of angular momentum
 - 10-3 Equipotential surfaces
 - 10-4 Equipotential surfaces for gravitational collapse
 - 10-5 Medium angular momentum per unit of mass
 - 10-6 Observations
 - 10-7 Other celestial bodies
 - 10-8 Persistence
 - 10-9 Why the center of a torus is empty?
 - 10-10 When a torus is not created
 - 10-11 Survey
 - 10-12 Possible mechanisms involving axial jets
 - 10-12.1 Energy source within the torus
 - 10-12.2 Matter in the hole of the torus
 - 10-12.3 Collimation of the jet
 - 10-12.4 Torus mediated collimation of Gamma Ray Burst during gravitational collapse
 - 10-13 Conclusions
 - References
11. Observational measurements prove Einstein's general relativity
- Abstract
 - Notation
 - 11-1 Introduction
 - 11-2 The three crucial tests of relativity
 - 11-3 Conclusions
 - References
12. Einstein's general relativity near a rotating mass
- Preface
 - Abstract
 - Notation
 - 12-1 Kerr's solution
 - 12-2 Reissner-Nordström solution
 - 12-3 Summary
 - References
13. Some line elements involving tanh not exhibiting black holes
- Abstract
 - Notation
 - 13-1 Schwarzschild solution with black hole
 - 13-2 Spherically-symmetric solutions without black holes
 - 13-3 Rosen's comments
 - 13-4 Comparing solutions
 - 13-5 Gravitational force and potential
 - 13-6 Energy density
 - 13-7 Acknowledgements
 - References

- 14. Gravity with variable rest mass
 - Preface
 - Abstract
 - Notation
 - 14-1 Introduction
 - 14-2 New interpretation of the Newtonian gravity
 - 14-3 The three crucial tests of relativity
 - 14-4 The three crucial tests applied to our variable mass theory
 - 14-5 Rotation
 - 14-5.1 Newtonian rotation
 - 14-5.2 Rosen's rotation
 - 14-5.3 Franklin's rotation
 - 14-5.4 Rotation that conserves angular momentum
 - 14-6 Variable central mass
 - 14-6.1 Variable central mass and rotation
 - 14-7 Quantum-gravitational orbitals
 - 14-8 Propagating gravitational field
 - 14-8.1 Background
 - 14-8.2 Delayed potential equations
 - 14-8.3 Solution of the delayed potential equations
 - 14-8.4 Rotation and delayed potential equations
 - 14-8.5 Additional phenomena and considerations
 - 14-9 Conclusions
 - References

- 15. Exponential gravitation – an exterior and interior solution without singularity
 - Preface
 - References to the preface
 - Abstract
 - Notation
 - 15-1 Introduction
 - 15-2 A physical solution both exterior and interior
 - 15-3 The three crucial tests of relativity applied to our exponential solution
 - 15-3.1 Advance of the perihelion of Mercury
 - 15-3.2 Gravitational redshift
 - 15-3.3 Summary of the three crucial tests
 - 15-4 The propagating field
 - 15-5 Comparing with other solutions
 - 15-6 Is something wrong with Einstein's general relativity?
 - 15-7 Experiments testing compatibility with the principle of equivalence
 - 15-8 Gravitational radiation
 - 15-8.1 Some effects of the coupling between electromagnetic radiation irradiated from a celestial body and its gravitational field
 - 15-9 Two interacting particles with variable rest mass
 - 15-10 Compatibility with variable mass
 - 15-11 When mass and its field are non-concentric
 - 15-12 Particles rotating around a central mass with conservation of angular momentum

- 15-13 Definition of angular momentum in rotation of particle around central mass
- 15-14 A physical approximation of the motion of a particle orbiting around a central mass
- 15-15 Astrophysical consequences
- 15-16 Quantum orbitals of gravitationally bounded particles
- 15-17 Electric charges with opposite signs
 - 15-17.1 A pair of two equal electric charges with opposite signs
- 15-18 Consequences, applications, and suggested new experiments
- 15-19 A brief comparison of the present theory with general relativity
- 15-20 Structure of pulsars and neutron stars considering sub-Bohr orbitals
 - 15-20.1 Introduction
 - 15-20.2 Structure of pulsars considering sub-Bohr orbitals
 - 15-20.3 Sub-Bohr orbitals in very massive stars
 - 15-20.4 Starquakes in non-pulsar massive bodies
 - 15-20.5 Sub-Bohr orbitals in supernovae
- 15-21 Features of our theory vs. general relativity
- 15-22 Figures comparing gravitational potential of our theory with pseudo-potential of general relativity
- 15-23 Two arbitrary variable masses
- 15-24 Summary
- References

- 16. "Unlimited" loans of energy
 - Preface
 - Abstract
 - 16-1 Introduction
 - 16-2 Loaning energy
 - 16-3 Electron capture
 - 16-4 Applications
 - 16-4.1 Transportation
 - 16-4.2 Home, office and factory heating
 - 16-4.3 Power stations
 - 16-4.4 Communication
 - 16-4.5 Improvement of the environment
 - 16-5 Other theories
 - 16-6 Discussion
 - 16-7 Conclusions
 - References

- 17. Decreasing and increasing gravitational intensity
 - Preface
 - Abstract
 - 17-1 Review
 - 17-2 Consequences of Podkletnov's experiment
 - 17-3 Gravitation as a field
 - 17-4 Predictions
 - 17-4.1 Suggested experiment
 - 17-4.2 Gravitational perpendicular gear

17-5 Measurements
 17-6 Diffraction
 References

18. Cosmology hypotheses based on ideas presented in this book
 Preface
 Cosmology hypotheses
 References

**PART IV: DISCUSSION, PREDICTIONS and
 APPENDIXES**

19. Discussion and predictions
 Abstract
 Notation
 19.1 The forbidden regions of general relativity
 19.1-1 Linear constant acceleration
 19.1-2 Forbidden regions are products of our mind
 19.1-3 Relativistic rotation
 19.1-4 Continuous radial expansion
 19.1-5 Adding perpendicular relativistic velocities
 19.1-6 Gravitation
 19.1-6.1 Solutions using tanh function
 19.1-6.2 Solution with variable rest mass
 19.1-6.3 An exterior and interior solution without singularity
 19.2 **Predictions** and new ideas in this book
 19.2-1 The velocity of rotation v is not equal to ωr
 19.2-2 Most of the mass of quarks is rotation energy
 19.2-3 Using rotation energy is one source of energy for quasars and active
 galactic nuclei
 19.2-4 Three-quark particles with zero spin
 19.2-5 Non-equivalence between gravity and acceleration of rotation
 19.2-6 Adding relativistic perpendicular velocities
 19.2-7 No black holes
 19.2-8 The rest mass is variable at rest and depends on the gravitational
 field of other masses
 19.2-9 Quantized orbitals of particles with Planck mass
 19.2-10 Spectrum of energies of gravitational waves
 19.2-11 Hyper-dense matter composed of pairs of particles with Planck
 mass
 19.2-12 The electric charge is variable
 19.2-13 New potential for Newtonian gravity
 19.2-14 The gravitational field possesses mass
 19.2-15 Gravitation is equilibrium between two more fundamental
 phenomena
 19.2-16 Physical explanation of Newton's second law
 19.2-17 The massive gravitational field is a component of the dark matter
 19.2-18 Each quark has a massive color field around itself

- 19.2-19 An additional set of quantized electrons orbitals around each atom
- 19.2-20 Sub-Bohr atomic spectrum of electromagnetic radiation
- 19.2-21 Equivalence between inertial mass and gravitational mass is not valid for high accelerations and for strong gravitational fields
- 19.2-22 Accurate measurements of advance of perihelia of Sun artificial satellites
- 19.2-23 Practically unlimited energy from the surroundings
- 19.2-24 Spectra with double redshifts in quasars
- 19.2-25 Explanation for exploding galaxies and quasars
- 19.2-26 Michelson-Morley experiments in space
- 19.2-27 Neutrinos do escape from supposed black holes
- 19.2-28 Explanation for starquakes in pulsars and Soft Gamma Repeaters
- 19.2-29 Giant gamma ray bursts in Soft Gamma Repeaters
- 19.2-30 No exception of gravitational field over magnetic/electric field
- 19.2-31 Decreasing and increasing gravitational intensity
- 19.2-32 Predicting luminosity magnitude versus z of galaxies that are farther away
- 19.2-33 No atomic number exceeding 137
- 19.2-34 Far infrared radiation of "dark matter"
- 19.2-35 Explanations of bounce-back in supernovae
- 19.2-36 A torus orbiting around most of the galaxies
- 19.2-37 The supernova type Ia standard candle is not standard
- 19.2-38 Contradicting measurements of the distance to the same galaxy
- 19.2-39 Helium produced in abundant stars is dispersed by pycno-nuclear supernovae type Ia
- 19.2-40 Type Ia supernovae with a magnitude greater than 25
- 19.3 New stages on the way to a gravitational collapse of celestial bodies
 - 19.3-1 Known stages: Gas, solid or liquid, photon gas, electron gas
 - 19.3-2 Collapse: Supernova
 - 19.3-3 Additional stage: Inner electrons orbitals
 - 19.3-4 Collapse: Gamma rays flux
 - 19.3-5 Stage: Neutron stars
 - 19.3-6 Additional stage: Torus
 - 19.3-7 Stage: Quasar (or microquasar)
 - 19.3-8 Additional stage: Pairs of gravitational particles
 - 19.3-9 The final stopping of collapse: Gravitational radiation
 - 19.3-10 Gamma-Ray Burst
 - 19.3-11 Mixed processes
- References (for the part of discussion, predictions and collapse)

APPENDIX A: Computer program of a numerical simulation of
 Franklin's rotation of a sphere with uniform mass
 density
 Output
 Explanations

APPENDIX B: Table of some useful physical constants

References (for Appendix B)

APPENDIX C: Some relevant solved exercises

Notation

C.1 Introduction

C.2 Newtonian constant mass

C.3 Newtonian variable mass

C.4 Newtonian, conservation of angular momentum

C.5 Newtonian, conservation of angular momentum with gravity

C.6 Relativistic, gravitational force between two masses, $M \gg m(r)$

C.7 Relativistic, gravitational force between two equal variable masses, $M = m(r)$

C.8 Relativistic, linear motion

C.9 Relativistic, conservation of angular momentum

C.10 Classical radius of electron

C.11 Comments

References (for Appendix C)

APPENDIX D: In memory of some scientists

APPENDIX E: Velocities beyond the speed of light c

Notation

E.1 Superluminal velocities

E.2 Energy at superluminal velocities

References (for Appendix E)

APPENDIX F: IARD: International Association for Relativistic Dynamics

ADDENDUM to this book: Some branches of relativity

Notation

Some branches of relativity

P.1 Relativistic rotation

P.2 Non-equivalence between gravity and acceleration of rotation

P.3 Rotating black hole

P.4 Exponential gravity

P.5 Exponential electric charge

P.6 Relativistic acceleration

P.7 Einstein-Infeld gravity field equivalent to mass

P.8 Relativistic expansion of the Universe

P.9 Relativistic dynamics

P.10 Relativistic quantum mechanics

P.11 Weyl-Dirac gravity

Discussion

References (for the addendum)

Name Index

Abbreviation Index

About the author

Note: The page numbers are omitted in this internet file, but appear in the book. There are additional small differences from the printed book: Two pairs of adjacent sections interchanged order, and one line changed.

**OVERVIEW (not included in the book) to the book:
"RELATIVITY, GRAVITATION, and RELATIVISTIC ROTATION:
Clarifying some paradoxes of relativity at the extreme"**

The second famous equation of special relativity is the relativistic addition of velocities $\mathcal{U} = \frac{v_1+v_2}{1+v_1v_2/c^2}$. When applying this formula to rotation, the obtained formula is not the classical one $v = \omega r$. P. Franklin (1922) derived a more precise approximate relativistic formula. When applying Franklin's formula of relativistic rotation new implications arise.

Independently, when applying $\mathcal{U} = \frac{v_1+v_2}{1+v_1v_2/c^2}$ on Hubble's Law of the expansion of the universe other new implications arise.

According to Einstein's special relativity theory $E = mc^2$, meaning that $m = E/c^2$. Before deriving the general relativity theory, Einstein (1912) considered the rest mass to be constant, i.e., not dependent on the distance to another mass. Einstein's limitation means that the rest mass includes many types of energy, but does not include gravitational energy. However when this constraint is removed, the rest mass will also include the gravitational energy, and is dependent on the distance to another mass. This theory and another theory detailed in this book predict $\beta_{\text{PPN}}-1$ accepted criterion different from the prediction of zero by Einstein's general relativity, but below 8×10^{-8} for the perihelion shift in the solar system. Precise observations of perihelion shift in the solar system allow for $\beta_{\text{PPN}} - 1 < 8 \times 10^{-8}$.

This book deals with these questions and others by the use of clear and simple mathematical terms. The book leads the reader through step by step derivations, with applications mainly in astrophysics.

From these new theories a new and surprising body of knowledge emerges, one that fits all the present observations and measurements as well as most of the predictions of the theory of general relativity. Moreover, in extreme cases it presents new predictions, including one surprising prediction of a new set of electron orbitals around a proton. This prediction needs verification by observation.

In these new and fresh formulations, the known paradoxes of astrophysics such as black holes, big bang, singularities, dark matter and dark energy do not exist because they are solved without needing any exotic concepts.

In addition, these concepts and mathematical formulations provide explanations to unsolved problems in physics. These include but are not limited to:

- a) How imploding supernovae bounce back outward to enormous explosions
- b) How thick accretion disks accelerate relativistic jets
- c) The structure and stability of quasars and active galactic nuclei and how they produce jets
- d) The sources of energy to these phenomena.

Nature has no obligation to conform to existing paradigms. The new theories presented in this book replace a few paradigms. Therefore, this book embarked on an ambitious endeavor.

This book leans on fundamental well accepted and proven components of Einstein's special relativity and Franklin's relativistic rotation. It modifies these concepts to derive new theories to explain phenomena of the universe at extreme conditions. It does this by using the same measurements prevailing in the field, but from them it derives new conclusions which are simpler and devoid of interpretations which are not necessary for science to be complete.

[1] Franklin, P., *The meaning of rotation in the special theory of relativity*, Proc. Nat. Acad. Sci. USA, v. 8, p. 265-268 (1922)

RELATIVITY, GRAVITATION, and RELATIVISTIC ROTATION:

Clarifying some paradoxes of relativity at the extreme

PART I: RELATIVISTIC ROTATION

1. Relativistic rotation without angular acceleration
2. Relativistic mass and angular momentum of a rotating sphere
3. The centripetal force in relativistic rotations
4. Quark's spin arising from Franklin's relativistic rotation
5. Quark's spin as the possible energy source of quasars and AGNs
6. Non-equivalence between gravity and acceleration of rotation

RELATIVITY, GRAVITATION, and RELATIVISTIC ROTATION:

Clarifying some paradoxes of relativity at the extreme

PART II: OTHER RELATIVISTIC MOTIONS

7. Star and galaxy travels
8. Relativistic radial expansion
9. Three dimensional relativistic velocities

RELATIVITY, GRAVITATION, and RELATIVISTIC ROTATION:

Clarifying some paradoxes of relativity at the extreme

PART III:

RELATIVITY, GRAVITATION and ELECTRIC CHARGE

10. Gravitational collapse of a rotating fluid object
11. Observational measurements prove Einstein's general relativity
12. Einstein's general relativity near a rotating mass
13. Some line elements involving tanh not exhibiting black holes
14. Gravity with variable rest mass
15. Exponential gravitation – an exterior and interior solution without singularity
16. "Unlimited" loans of energy
17. Decreasing and increasing gravitational intensity
18. Cosmology hypotheses based on ideas presented in this book

RELATIVITY, GRAVITATION, and RELATIVISTIC ROTATION:

Clarifying some paradoxes of relativity at the extreme

PART IV: DISCUSSION, PREDICTIONS and APPENDIXES

19. Discussion and predictions

19.1 The forbidden regions of general relativity

19.2 **Predictions** and new ideas in this volume

19.3 New stages on the way to a gravitational collapse of celestial bodies

APPENDIX A: Computer program of a numerical simulation of Franklin's rotation of a sphere with uniform mass density

APPENDIX B: Table of some useful physical constants

APPENDIX C: Some relevant solved exercises

APPENDIX D: In memory of some scientists

APPENDIX E: Velocities beyond the speed of light c

APPENDIX F: IARD: International Association for Relativistic Dynamics

ADDENDUM: Some branches of relativity

Name Index

Abbreviation Index

About the author

The publisher of this book is Technology Dynamics, Inc.

For ordering information, please contact Dillon Eliassen at 201-385-0500 (U.S.A.)
or email

dillone.bookorder@gmail.com

Payment and inquiries may be mailed to:

Technology Dynamics, Inc.

100 School St.

Bergenfield, NJ 07621

U.S.A.

About the author see previous and next pages

Author's emails:

nbenamots@yahoo.com

benamots@alumni.technion.ac.il