

My work On Relativity

Note: the titles contain 2 links, the first points to the article stored in Academia, the second to the article stored in Blogspot

« [Relativistic dynamics: force, mass, kinetic energy, gravitation and dark matter](#) »

Special relativity does not deal with acceleration, general relativity does not deal with non gravitational acceleration, which leave the theory of relativity imperfect. We will demonstrate some relativistic dynamical laws that specify relativistic acceleration, force and kinetic energy. Also, based on equivalence principle does gravitational mass vary with inertial mass?

Researchgate.net: [Relativistic dynamics: force, mass, kinetic energy, gravitation and dark matter](#)

<https://pengkuanonphysics.blogspot.com/2021/07/relativistic-dynamics-force-mass.html>

https://www.academia.edu/49921891/Relativistic_dynamics_force_mass_kinetic_energy_gravitation_and_dark_matter

« [Trajectory of 'Oumuamua and wandering Sun, alien asteroids and comets detected by SOHO](#) »

The apparent non-gravitational acceleration the extra-solar-system 'Oumuamua exhibits is puzzling. We find that when the position and velocity of the Sun is correctly set in computing the predicted orbit, 'Oumuamua's trajectory can be explained with gravity and we have reproduced the unexpected gap by computation. We also propose to search for new extra-solar-system high speed asteroids with SOHO to check our method with their trajectories.

<https://pengkuanonphysics.blogspot.com/2023/04/trajectory-of-oumuamua-and-wandering.html>

Researchgate.net: [Trajectory of 'Oumuamua and wandering Sun, 1 alien asteroids and comets detected by SOHO](#)

https://www.academia.edu/100818112/Trajectory_of_Oumuamua_and_wandering_Sun_alien_asteroids_and_comets_detected_by_SOHO

« [Radius of a black hole](#) for relativity and [Newtonian mechanics](#) »

The Schwarzschild radius is the radius of the event horizon of a black hole. Amazingly, we can compute it with Newtonian mechanics

<https://pengkuanonphysics.blogspot.com/2022/08/radius-of-black-hole-for-relativity-and.html>

Researchgate.net: [Radius of a black hole for relativity and Newtonian mechanics](#)
https://www.academia.edu/84798805/Radius_of_a_black_hole_for_relativity_and_Newtonian_mechanics

« [What is the thickness of the event horizon of a black hole?](#)»
https://pengkuanonphysics.blogspot.com/2022_08/what-is-thickness-of-event-horizon-of.html
Researchgate.net: [What is the thickness of the event horizon of a black hole?](#)
https://www.academia.edu/85298332/What_is_the_thickness_of_the_event_horizon_of_a_black_hole

« [How galaxies make](#) their rotation curves flat and [what about dark matter?](#)»
The rotation curves of disc galaxies are flat and dark matter is speculated as explanation. Alternatively, the gravity of material disk could explain the flat curves. Using the gravitational force that a disk exerts on a body in the disk, we have computed the the rotation curves of disc galaxies and the curve of their mass densities. The numerical result fits the flat curves and the observed mass densities of galaxies. This theory gives a new way to measure the masses of galaxies using their rotation velocities and shape.
Researchgate.net: [How galaxies make their rotation curves flat and what about dark matter?](#)
<https://pengkuanonphysics.blogspot.com/2021/04/how-galaxies-make-their-rotation-curves.html>
https://www.academia.edu/46903516/How_galaxies_make_their_rotation_curves_flat_and_what_about_dark_matter

« [Gravitational time dilation](#) and [black hole](#) »
In this article, we derive the gravitational time dilation factor in a new manner, which allows us to identify the mathematical cause of Schwarzschild radius, to give a theoretical way to avoid it and to compute properties of black hole. General relativity effects are computed as simple as in special relativity. Observability of black hole is discussed.
Researchgate.net: [Gravitational time dilation and black hole](#)
https://www.academia.edu/45434676/Gravitational_time_dilation_and_black_hole
<https://pengkuanonphysics.blogspot.com/2021/03/gravitational-time-dilation-and-black.html>

« [Analytical equation for Space-Time geodesics](#) and [relativistic orbit equation](#) »
This article exposes an analytical orbit equation for relativistic gravity and explains how it is derived without Space-Time geodesics.
Researchgate.net: [Analytical orbit equation for relativistic gravity without using Space-Time geodesics](#)
<https://pengkuanonphysics.blogspot.com/2020/11/analytical-orbit-equation-for.html>
https://www.academia.edu/44540764/Analytical_orbit_equation_for_relativistic_gravity_without_using_Space_Time_geodesics

« [Relativistic kinematics](#) »
The erroneous part of the initial version is suppressed
Like in Newtonian kinematics, the relativistic change of reference frame must be a vector system of transformation laws for position, velocity and acceleration.
<https://pengkuanonphysics.blogspot.com/2020/11/relativistic-kinematics.html>
https://www.academia.edu/4458207/Relativistic_kinematics

« [Relativistic kinematics](#) and [gravitation](#) (initial version)»
The part concerning gravitation is erroneous
Like in Newtonian kinematics, the relativistic change of reference frame must be a vector system of transformation laws for position, velocity and acceleration.
Researchgate.net: [Relativistic kinematics and gravitation](#)
<https://pengkuanonphysics.blogspot.com/2020/05/relativistic-kinematics-and-gravitation.html>
https://www.academia.edu/42973353/Relativistic_kinematics_and_gravitation

« [Time-rate change](#) in relatively [moving frames](#) »
To clearly explain the contradiction between the constant flow of ticks delivered by clocks and the relativistic time dilation
Researchgate.net: [Time-rate change in relatively moving frames](#)
<https://pengkuanonphysics.blogspot.com/2020/09/time-rate-change-in-relatively-moving.html>
https://www.academia.edu/44018092/Time_rate_change_in_relatively_moving_frames

« [Explaining Oumuamua](#) and Pioneer anomaly [using Time relativity](#) »
The part concerning gravitation is erroneous
Like in Newtonian kinematics, the relativistic change of reference frame must be a vector system of transformation laws for position, velocity and acceleration.
Researchgate.net: [Explaining Oumuamua and Pioneer anomaly using Time relativity](#)

« [Oumuamua, Pioneer anomaly](#) and solar mass [with Time Relativity](#) »
The part concerning gravitation is erroneous
The theory of Time relativity explains well the weird behavior of the interstellar object 'Oumuamua.
Researchgate.net: ['Oumuamua, Pioneer anomaly and solar mass with Time Relativity](#)

« [Velocity, mass, momentum and energy of an accelerated object](#) in relativity » .
Analytical derivation of relativistic velocity, mass, momentum and kinetic energy of an accelerated object.
Researchgate.net: [Velocity, mass, momentum and energy of an accelerated object in relativity](#)

« [Time relativity](#) transformation [of velocity](#) » .

Relativistic transformation of velocity creates a discrepancy. A discrepancy-free transformation of velocity is derived using the Time relativity transformation of coordinates.

Researchgate.net: [Time relativity transformation of velocity](#)

« [Time relativity transformation of coordinates](#) » .

Without length contraction, time relativity transformation solves paradoxes and explains incongruent relativistic experiments
Researchgate.net: [Time relativity transformation of coordinates](#)

« [Discrepancy of length contraction](#) » .

Drawing relativity <https://pengkuanonphysics.blogspot.com/2020/02/drawing-relativity.html>

« [Length, distance and Michelson–Morley experiment](#) » .

There are 2 types of length contraction: Object contraction and Distance contraction. Each has a different physical meaning.
Researchgate.net: [Length, distance and Michelson–Morley experiment](#)

« [Analysis of Einstein's derivation of the Lorentz Transformation](#) » .

Einstein's derivation of the Lorentz Transformation is purely theoretical. This study shows how it is related to the physical phenomenon of time dilation and length contraction.

Researchgate.net: [Analysis of Einstein's derivation of the Lorentz Transformation](#)

« [Synchronizing moving GPS clocks](#) » .

Relativity of simultaneity destroys synchronization of GPS satellites

Researchgate.net: [Synchronizing moving GPS clocks](#)

« [Testing relativity of simultaneity using GPS satellites](#) »

Relativity of simultaneity can be measured with clocks of GPS satellites

Researchgate.net: [Testing relativity of simultaneity using GPS satellites](#)

« [From Michelson–Morley experiment to length contraction](#) »

Length contraction is used to explain Michelson–Morley experiment. But the variation of distance due to time dilation is more appropriate to explain this experiment.

Researchgate.net: [From Michelson–Morley experiment to length contraction](#)

« [Astrophysical jet and length contraction](#) »

Astrophysical jets are flows of matter that moves at relativistic speed. They are opportunity to see length contraction in action. An astrophysical jet is analyzed to explain the length contraction effect.

Researchgate.net: [Astrophysical jet and length contraction](#)

« [How to test length contraction by experiment?](#) »

Relativistic length contraction is theoretically predicted but not directly tested, which lead to incorrect interpretation of the theory illustrated by Bell's spaceship paradox and Ehrenfest paradox. But these paradoxes can help us designing experiments to test length contraction
Researchgate.net: [How to test length contraction by experiment?](#)

« [Twin paradox when Earth is the moving frame](#) »

We analyze the mathematical mechanism that slows the time of the traveler in the twin paradox and explain what distinguishes the traveler's frame from the Earth's frame

Researchgate.net: [Twin paradox when Earth is the moving frame](#)