



# Henri Poincaré's Special Theory of Relativity

**Date:** April 17, 2024 (Wednesday)

**Time:** 5:00 p.m.

**Venue:** CYPP2, LG1/F, Chong Yuet Ming  
Physics Building, Main Campus, HKU



*Prof. Xiaofeng JIN*  
*Fudan University*

**Abstract:** In this talk, Prof. Xiaofeng Jin will systematically introduce the mental journey of Henri Poincaré in establishing the special theory of relativity. It includes the following:

- The mathematical structure of 2+1 dimensional pseudo-Euclidean geometry in 1881;
- The viewpoint on the existence of ether in 1888;
- Issues regarding time measurement, the postulate of the constancy of the speed of light, and the problem of simultaneity at different locations in 1898;
- The principle of total momentum conservation for matters and electromagnetic field in 1900, a beam of electromagnetic radiation equivalent to a hypothetical fluid with inertia  $m = E/c^2$ , and a method proposed for synchronizing clocks at different locations using light signals, resulting in the time transformation formula under first-order approximation:  $t' = t - vx/c^2$ ;
- The principle of relativity in classical mechanics and the unobservability of Earth's motion relative to the ether in 1902; the relativity of simultaneity;
- The complete statement of the principle of relativity in 1904;
- The pseudo-Euclidean geometry structure and the Lorentz transformation as a four-dimensional spacetime rotation around the origin, which together with spatial rotation forms the Lorentz group, published in two articles on June 5 and July 23 in 1905. The relativistic velocity addition rule; mathematical formulas for length contraction, time dilation, and the relativity of simultaneity at different locations; the complete covariance of electrodynamics; the relativistic principle of least action; the Lorentz group symmetry of physical laws; and the relativistic motion equations for electrons.

**Biography:** Prof. Xiaofeng Jin received B.S. and Ph.D degrees in physics from Fudan University in 1983 and 1989, respectively. He joined Fudan University as a faculty member in 1989 and now is a XieXide Chair Professor of Physics. He is a condensed matter experimentalist and has worked on ultra-thin film magnetism, surface and interface of semiconductors and metals, spin-dependent transport in low dimensional systems, etc. He has published over 100 technical articles in peer-reviewed journals, given more than 50 invited presentations at international conferences. Prof. Jin has won the National Outstanding Youth Science Foundation, Outstanding Shop Note Award of Journal of Vacuum Science and Technology, Outstanding Young Scholar Award, Yangtze River Scholars Award, and HuGangfu Prize in Physics.

**Anyone interested is welcome to attend!**

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