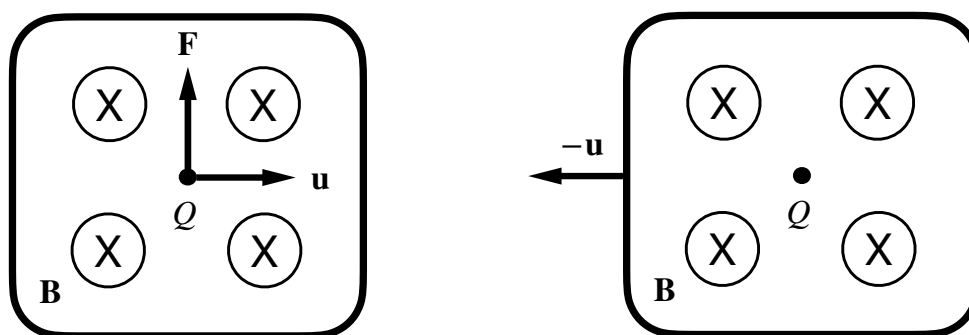




How to get from static to dynamic electromagnetism

Prof. Dr. Jürgen König

Universität Duisburg-Essen



We demonstrate how to derive Maxwell's equations, including Faraday's law and Maxwell's correction to Ampère's law, by generalizing the description of static electromagnetism to dynamical situations. Thereby, Faraday's law is introduced as a consequence of the relativity principle rather than an experimental fact, in contrast to the historical course and common textbook presentations. As a by-product, this procedure yields explicit expressions for the infinitesimal Lorentz and, upon integration, the finite Lorentz transformation. The proposed approach helps to elucidate the relation between Galilei and Lorentz transformations and provides an alternative derivation of the Lorentz transformation without explicitly referring to the speed of light. The talk is based on [Eur. J. Phys. 42, 045204 \(2021\)](#).