

Relativistic Kinematics of Particle Interactions

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18 hours: 6 lectures (12 hours) and 6x1 hours of practical training

1. Introduction, Lorentz transformations, Four-vectors, units and conventions in particle physics, Energy dependence of the reaction cross section and specifications of different areas.
2. Classification of the scattering reactions, The Mandelstam variables, The reaction threshold , The relative velocity, The invariants.
3. The inclusive reactions , The rapidity and pseudorapidity, Decay of one particle into two particles.
4. The reaction cross-section , The methods of the cross-section measurements, The cross-section and phase space, The scattering matrix.
5. The Dalitz plot, The momentum configuration on the Dalitz plot, Dalitz plot and symmetries, Phase space.
6. Numerical methods for phase space calculations, Phase space integrals, Examples: pion decay, muon decay.

Literature:

- [1]. E. Byckling and K. Kajantie, "Particle Kinematics", Wiley, New York, 1973.
- [2]. "Relativistic Kinematics of Particle Interactions" by W von Schlippe, March 2002.
- [3]. V.I. Goldanskii, Yu.P. Nikitin, I.L. Rozenal, "Kinematic Methods in High-Energy Physics", 1989 by Harwood Academic Publishers GmbH, Switzerland.
- [4]. "Review of Particle Physics" (Particle Data Group, 2018), <http://www-pdg.lbl.gov/>