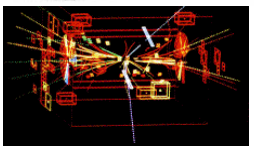


The image contains two plots. On the left is a circular detector layout for L3, showing various subdetectors and their arrangement. On the right is a plot of the Z boson resonance cross-section. The x-axis is the center-of-mass energy  $\sqrt{s}$  in GeV, ranging from 86 to 96. The y-axis is the cross-section in nb, ranging from 0 to 30. Three curves are shown for different numbers of neutrino generations:  $N_\nu=2$  (red),  $N_\nu=3$  (green), and  $N_\nu=4$  (blue). The data points (black dots) are fitted by these curves, showing a peak at approximately 91.2 GeV.



A 3D visualization of particle tracks, likely from a detector, showing various paths and interactions in a complex, multi-colored environment.

## Advanced Particle Physics

Date: Friday, 9:15 – 11:00  
Venue: HS2 INF227  
Lecturer: Ulrich Uwer

<http://www.physi.uni-heidelberg.de/~uwer/lectures/ParticlePhysics/>

## Advanced Particle Physics

### Outline

- I. Introduction
- II. Pre-requisite
- III. QED for “pedestrians”
- IV.  $e^+e^-$  annihilation experiments below the Z resonance
- V. Experimental studies of QCD
- VI. Probing the weak interaction
- VII. Electro-weak unification: Phenomenological approach to the SM
- VIII. Experimental test of the Standard Model (SM)
- IX. Flavor oscillations
- X. The quest for new physics at current and future accelerators

## Literature

- F.Halzen, A.Martin: Quarks and Leptons, John Wiley.
- C.Berger: Elementarteilchenphysik, Springer.
- D.H.Perkins: Introduction to High Energy Physics, Cambridge University Press.
- D.Griffith: Introduction to Elementary Particles, John Wiley.
- P.Renton: Introduction to the Physics of Quarks and Leptons, Cambridge University Press.
- E.Leader und E.Predazzi: An Introduction to Gauge Theories and Modern Particle Physics, Vol. 1+2, Cambridge Mongraphs.
- Particle Data Group: Review of Particle Physics, 2006.
- Original literature
- Web links