Experience with the L3 Vertex Drift Chamber at LEP

L3 Vertex Chamber Group

presented by **Botio Betev**

Laboratory for High Energy Physics, ETH Zurich, Switzerland

The design, performance, running parameters, infrastructure and operational history of the pressurized, high resolution drift chamber, based on the time expansion principle, is described. This cylindrical chamber with an outer diameter of 93.7 cm and sense wires with length of 98.0 cm was the tracking device of the L3 Experiment during 11 years of LEP operation. The total received radiation dose in the central region during this period, measured by the L3 radiation monitor is about 2300 rad. The radiation received on the wires, estimated from their integrated counting and tracks rate, amounts to $8.0 \cdot 10^{-6}$ C/cm.

Summary of Talk: The tracking chamber of the L3 Experiment at LEP, based on the time expansion principle, its design, running parameters, performance and operational history, as well as its gas system and gas test chamber are described. The chamber is a cylinder with outer diameter of 93.7 cm and sense wires with length of 98.0 cm. The volume is divided into two concentric cylinders. The inner cylinder is subdivided into 12 sectors, and the outer into 24 sectors. The wire configuration of each sector divides the volume into detection gap and drift region. These are separated by the grounded grid planes, made out of 100 micron gold-plated copper-beryllium wires. The sense anode wires, 8 in each inner sector and 54 in each outer sector, are made of 20 micron gold- plated tungsten. The voltage gradient between the anodes and the grid (3mm distance) is 2.9 kV. The gas mixture used is carbon dioxide/isobutane 80:20 at an absolute pressure of (1.200 +- 0.1%) bar. The gas flow refreshes the chamber gas volume in about five hours. The gas components are monitored by a mass spectrometer and a test chamber, based also on the time expansion principle. The long-term stability of the gas parameters was at the 0.1% level. The average number of electrons seen by an anode acceptance region is about 30 and the gas gain in the detection gap is on the order of 50,000. During the 11 years of operation at LEP, the total received radiation dose in the central region measured by the L3 radiation monitor is about 2300 rad. The pulse amplitude on the anodes, induced by the electron clusters remained unchanged during all 11 years of running the chamber at LEP. Unchanged remained also the single wire resolution, which was in the order of 50 microns.