CHAPTER 39

PHYSICS AND ASTROPHYSICS

Doctoral Theses

340. ASHISH KUMAR
Large PT Processes in PP Collisions at 2 TeV
SupervisorS : Prof. R. K. Shivpuri and Prof. D. P. Goyal
Th 14762

Abstract

Describes a measurement of the tt production cross section in the dielectron channel using data from Run 11 of the Tevatron collected with the upgraded DO dector at Fermilab. The data sample corresponds to an integrated luminosity of 384 pb-1, with is ~3.5 times than the data used in Run 1. The analysis employs kinematic and topological selections to select candidate events. The analysis results show considerable improvement from the previous pass of analysis based on 243pb-1 of data.

Contents

1. Introduction and phenomenological motivation. 2. The DO detector at tavatron. 3. Data and Monte Carlo samples. 4. Event reconstruction and object indentification. 5. Measurement of tt production cross section. 6. Summary.

341. BUDAKOTI (Girish Chandra)
Growth, Characterization and Improvement of Undoped and Fe-doped High-Tc LiNbo3 Single Crystals.
Supervisors : Prof. G. C. Trigunayat and Dr. Binak Kumar
Th 14765

Abstract

The work carried out so far on the LiNbo3 single crystals in respect of crystal growth, doping effect, crystalline perfection, piezoelectricity, defect structure, optical properties, and the effect of thermal annealing and polin on the crystal quality have been reviewed. Based on that, the work plan for the proposed investigation has been formulated. Single crystals of LiNbo3, both undoped and Fe-doped (0.02 & 0.05mol %), of length nearly

50mm and diameter nearly 25mm were grown by Czochralski technique along (001) direction. The experimental parameters life thermal gradient, rotation and pulling rates were optimized for growth of highly perfect crystals. Single domain crystals were obtained by poling with current density of 1.5-2mA/cm2 during growth. Specimens of thickndess 2mm were cut perpendicular to the growth direction from the crystal boules. They were lapped and polished with fine alumina powder to achive flat surfaces. Mechanically demaged surfaces and any impurities resulting from lapping and polishing were removed by etching, carried out with a mixture of HNO3 and HF. The crystalline perfectio, piezoelectric response, defect structure and ionie impurities were investigated by high-resolution X-ray diffraction (HRXRD), piezometer, UV-Vis and Fourier transform infrared (FTIR) spectrometers, respectively

Contents

342. CHATTERJI (Sudeep)
QCD Test at the Large Hadron Collider at CERN
Supervisor : Prof. R. K. Shivpuri
Th 14764

Abstract

Studies the breakdown performance of silicon microstrip detectors as well as some physics aspects of proton-proton collisions at LHC, CERN. It veryfs the predictions of Quantum Chromodynamics (QCD) in large Pt processes. Also, inb order to verify that the fabricated detectors are meeting the required specifications. Static and dynamic measurenments on these sensors have been carried out. The performance studies that have done are: Static measurement test to measure 1-V and C-V characteristics of Sidetectors. Dynamic test to measure Signal/Noise ratio and charge-collection efficiency. Radiation hardness studies. The work covers almost all the aspects of detector development and improves upon the device characteristics in the subsequent batches.

Contents

1. Introduction 2. The physics of silicon detectors. 3. Annealing studies of Boron implanted defects in silicon detector. 4. Interstrip capacitance and noise measurement of silicon microstrip detector. 5. Impact of harsh radiation on metal-over-hang equipped sensors in the LHC environment. 6. Gamma + I Jet analysis using CMS object oriented simulation. Bibliography

343. SALAH (Numan)
Luminescence Characteristics of Some Rare Earth Doped Sulfate and Fluoride Materials
Supervisor : Dr. P. D. Sahare
Th 14763

Abstract

Attempts to improve upon the already existing phosphors by using different techniques. Further attempts have also been made to improve their characteristics by co-doing with new impurities. Also deals with the explanation of the TL phenomenon that still remain as complex as it was when discovered, using several well-known TL models. Comparatives studies of TL and PL have also been made for understanding the mechanism of production and annihilation of defects created by impurities doping/ codoping and their role in TL. Emphasis has also been made on the new methods of preparation of TLD materials. Further, some glsow curve deconvolution (GCD) functions have been modified and used to isolated the peaks of some complex glow curve to obtain there trapping parameters. A new computer cod has also been developed for this purpose.

Contents

1. Introduction 2. Experimental. 3. Sulfate materials (CaSo4:Day). 4. Langbeinite (K2Ca2(So4)3). 5. Mixed alkali and alkaline earth sulfates (LiNaSo4:Eu,BaSr(So4)2:Eu. 6. Fluoride materials (Lif:Mg, Cu, P and its nanoparticles). 7. Summary, Conclusions and Bibliography.