

# T475: A Test of the Gas Cherenkov Counter

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A prototype gas Cherenkov counter to be used in the proposed experiment at SPring-8 to study the GDH sum rule(GDH experiment) has been built and tested at T1 beam line of KEK-PS. The GDH experiment aims at measuring the helicity dependent total photoabsorption cross-sections of the proton at photon energies ranging from 1.5 to 2.9 GeV. The results will be employed alongside other proposed measurements at other parts of the world to test the validity of the Gerasimov & Drell-Hearn(GDH) sum rule. The Cherenkov counter is required to have a high detection efficiency to electrons in order suppress electromagnetic shower events in a trigger level. The counter uses atmospheric CO<sub>2</sub> gas( $n=1.00041$ ) with a thickness of 100 cm as a radiator gas and a photo-multiplier(Hamamatsu R1250-03) with a photo-cathode of 5 inch in diameter.

Particle identification in the test was accomplished with a time of flight (TOF) system, two gas Cherenkov counters placed in front of the Cherenkov counter on test and a lead glass calorimeter placed most downstream of the setup as shown in Fig.1. A time resolution of 110 ps for the flying path of 7.4 meters was obtained in the TOF system.

We obtained the ADC distribution of the Cherenkov counter for electrons at 300 MeV as shown in Fig.2. It gives the detection efficiency of 99.6% for the threshold level of one photo-electron corresponding to the output voltage of the photo-multiplier of about 100 mV. This efficiency leads more than 99.9% for the efficiency to electromagnetic shower events expected in the GDH experiment.

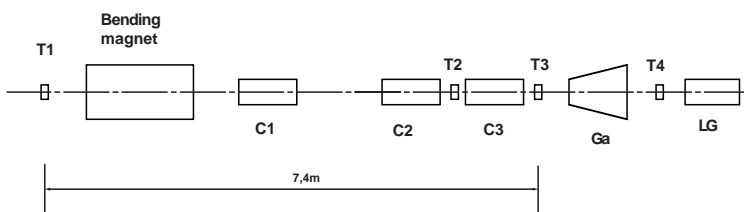


Fig.1 The setup of the test in the T1 beam. T1,T2,T3 and T4: TOF counters used for the trigger, C1 and C2: gas Cherenkov counters for particle identification, C3: a gas Cherenkov counter on test, Ga: the gamma-ray detector on test, LG: lead glass calorimeter.

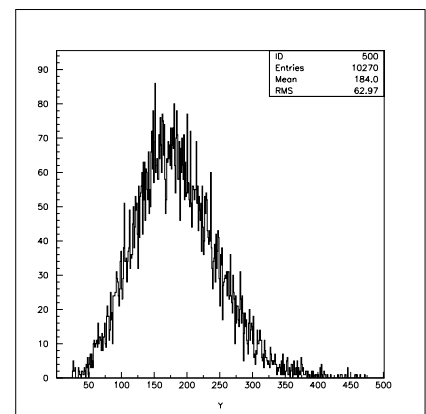


Fig.2 The ADC distribution of the Cherenkov counter for 300 MeV electrons.