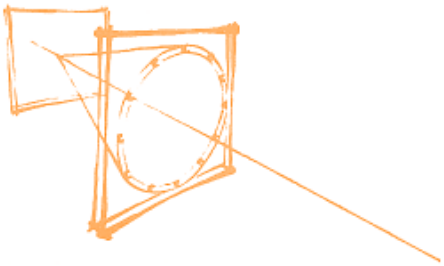

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Study of 144 Channel Multi-Anode Hybrid Avalanche Photo-Detector For the Belle-II RICH Counter

mardi 4 mai 2010 14:30 (25 minutes)

For the Belle-II experiment, we have been developing a proximity focusing RICH counter
with silica aerogel radiator as a new particle identifier
in the forward endcap to extend the ¥pi/K separation capability up to 4 ¥$sigma$ at 4 GeV/c.
Our requirements on a RICH photon detector are the following:
(1) sensitivity to single photons, (2) immunity to magnetic field, (3) granularity of ¥sim5¥$times$5 mm^2, (4) large effective area,
(5) compact size due to the limited available space.
To fulfill these conditions, R¥&D on a new hybrid avalanche photo-detector (HAPD) has been conducted with HPK
for several years. In this device, vacuum tube with a bi-alkali photocathode
is coupled to an avalanche photo-diode (APD), which is pixelated into 6¥$times$6 pads,
each of which is 5¥$times$5 mm^2;
1 HAPD accommodates 4 APD chips, amounting to 144 pads total.
More than 10 HAPDs have been newly produced since 2008.
Fundamental features of HAPD samples were examined using a light source at the lab.
Total gain was obtained to be about 5¥$times$10^4 and a clear single photon signal was detected.
Basic operations of HAPD under an axial magnetic field of 1.5 Tesla was also studied and
the cross-talk due to electron back-scattering was very much suppressed
and single photon sensitivity was improved.
Recently, a new HAPD with high QE was successfully fabricated, and a QE exceeding 30 ¥% could be confirmed.
With these HAPD samples, a RICH prototype counter was built.
In this set-up, a 2¥$times$3 HAPDs were arranged with a custom-made ASIC readout system,
by which signals were amplified and digitized. A test beam experiment was including the latest beam testcarried out in November 2009 at KEK. We obtained 2.5 times larger photoelectron yield with 40 mm-thick aerogel radiator compared to
the previous beam test, and from these results the ¥pi/K separation capability exceeding 5¥$sigma$ at 4 GeV/c was demonstrated.
In this report detail results of HAPD studies will be presented.

Please indicate ”poster” or ”plenary” session. Final decision will be made by session coordinators.

plenary

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Classification de Session: Photon detection for Cherenkov Counters - solid state and hybrid devices

Classification de thématique: Photon detection for Cherenkov counters