

RoentDek

UHV-Detectors Handels GmbH
Supersonic Gas Jets
Multifragment Imaging Systems

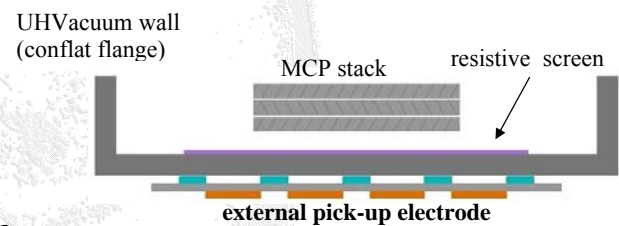


“RS” single particle and photon counting detector

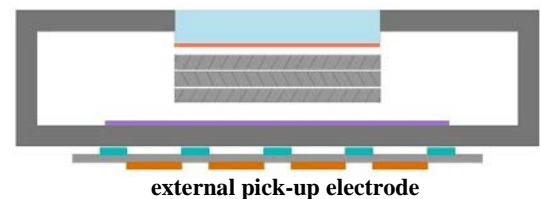
Based on **RoentDek**'s well-established single particle/photon counting delay-line detector technique we have developed a complementary read-out concept for MCPs which allows for mounting an external read-out anode, i.e. outside of the vacuum. This so-called **Resistive Screen** technique is especially suited for flange-mounted particle/photon detectors and sealed photo-multiplier tubes (“image intensifier”) operated as **TSCSPC**: time- and space-correlated single photon counters.

For both applications, the mechanical design of the detector head is much simplified compared to the use of in-vacuum read-out anodes (like the standard DLD anodes from **RoentDek**). Furthermore, it is easy to service the anode or even swap anodes/read-out methods while the detector head remains untouched and vacuum conditions are maintained (reconfigurable anode). The features of this novel detector type can be summarized as follows:

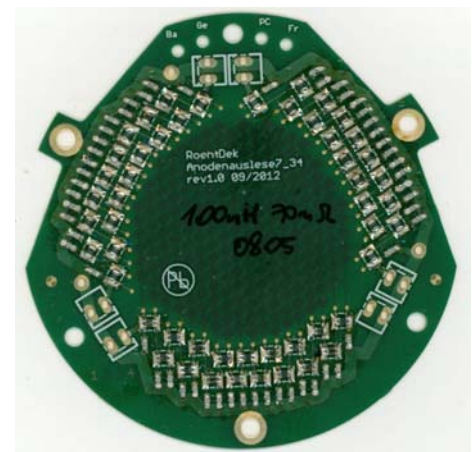
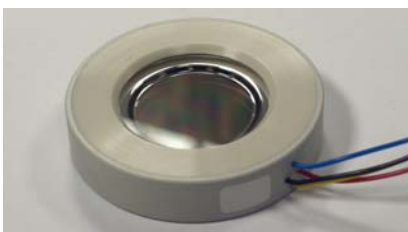
- true single event counting
- extremely low background
- unlimited dynamic range
- spatial resolution 50 micron
- temporal resolution 100 ps
- throughput: 1 million particles/photons per sec
- open diameter between 25 and 75 mm (typical: 40 mm)
- “List-mode” event storage with X,Y,T,... information
- reconfigurable air-side read-out anode:
 - Other specified read-out methods include
 - Wedge-and Strip/Tetra-Wedge Anode
 - Resistive Anode Encoder
 - Pixel/strip arrays



MCP-PMT with photo cathode and resistive screen



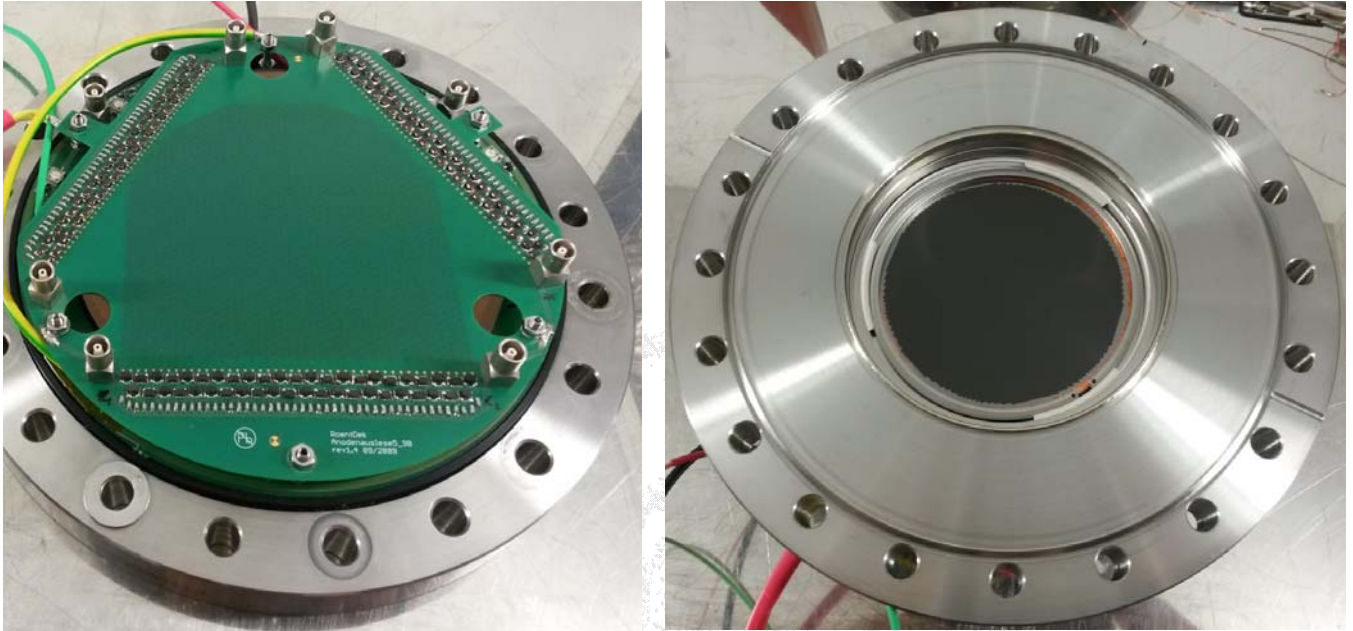
Pictures below: 25mm MCP-PMT with resistive screen and LC delay-line read-out anode to be placed onto the ceramic rear wall for external signal pick-up.



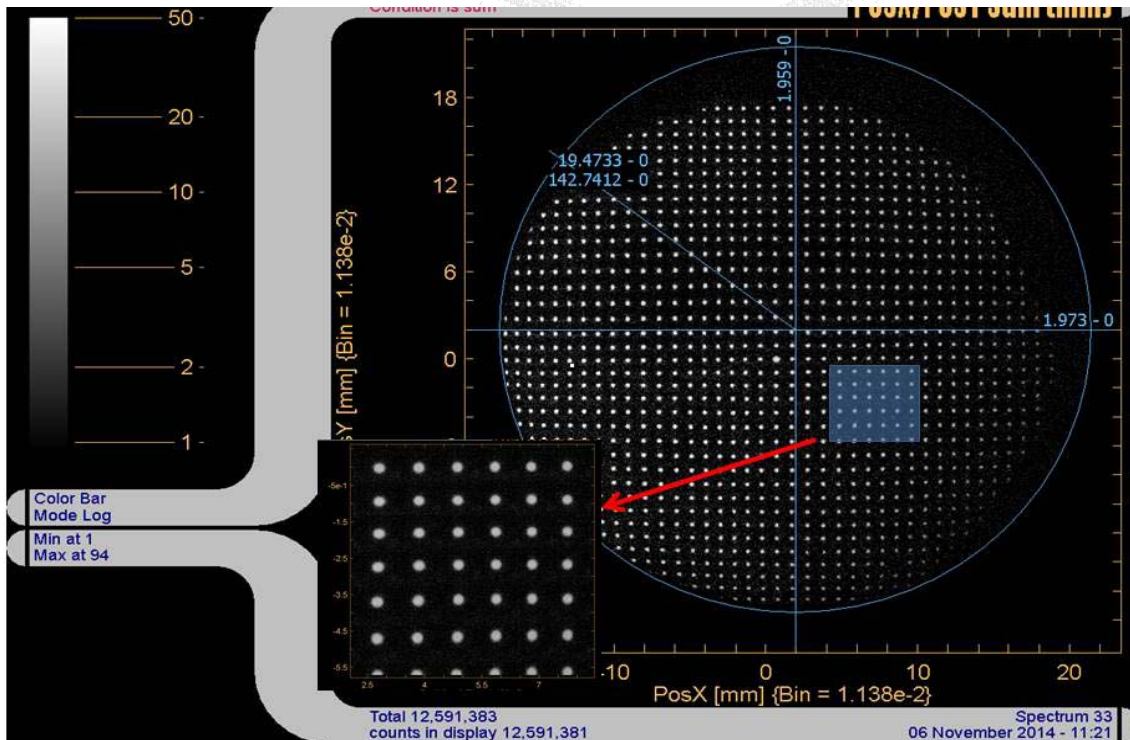
LC delay-line Hexanode

The advantages of this read-out-method are obvious: for image intensifiers (detecting *visible/near-UV* photons) tube production is much facilitated because there is no need to embed delicate read-out electrode structures inside the tube. Different readout methods can be applied on the same detector head.

For open-face detectors (detection of *charged particles* or *VUV/X-ray* photons) the detector head comes readily assembled for simple mounting to a suitable UHV port (typically DN100CF) of the vacuum chamber. The detector head can be baked up to 150 °C and has increased tolerance for operation in magnetic field environments compared to the standard **RoentDek** DLD detectors.



*75mm active RS-DLD with external Hexanode delay-line read-out (left) on DN160CF flange for bolt-on to a vacuum chamber port (right picture: vacuum side of the detector showing the MCP stack's input face). The Hexanode read-out geometry provides intrinsic control of the spatial resolution and linearity as function of position. Furthermore, **RoentDek** read-out electronics monitors the pulse height distribution homogeneity and can verify the uniformity of detection efficiency during operation.*



Imaging response of a 40mm detector to a test mask with 0.2mm holes every mm