

# The RPC “Thin” Monitoring Detectors

(Ion Chamber and Čerenkov Monitor)

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Role of the “thin” monitors:

1. “thin/thick” signal used as input for aligning the diamond crystal axis,
2. “thin” detectors serve as relative monitors of photon flux, and they
3. monitor and track beam stability, (indirect info. on beam polarization).

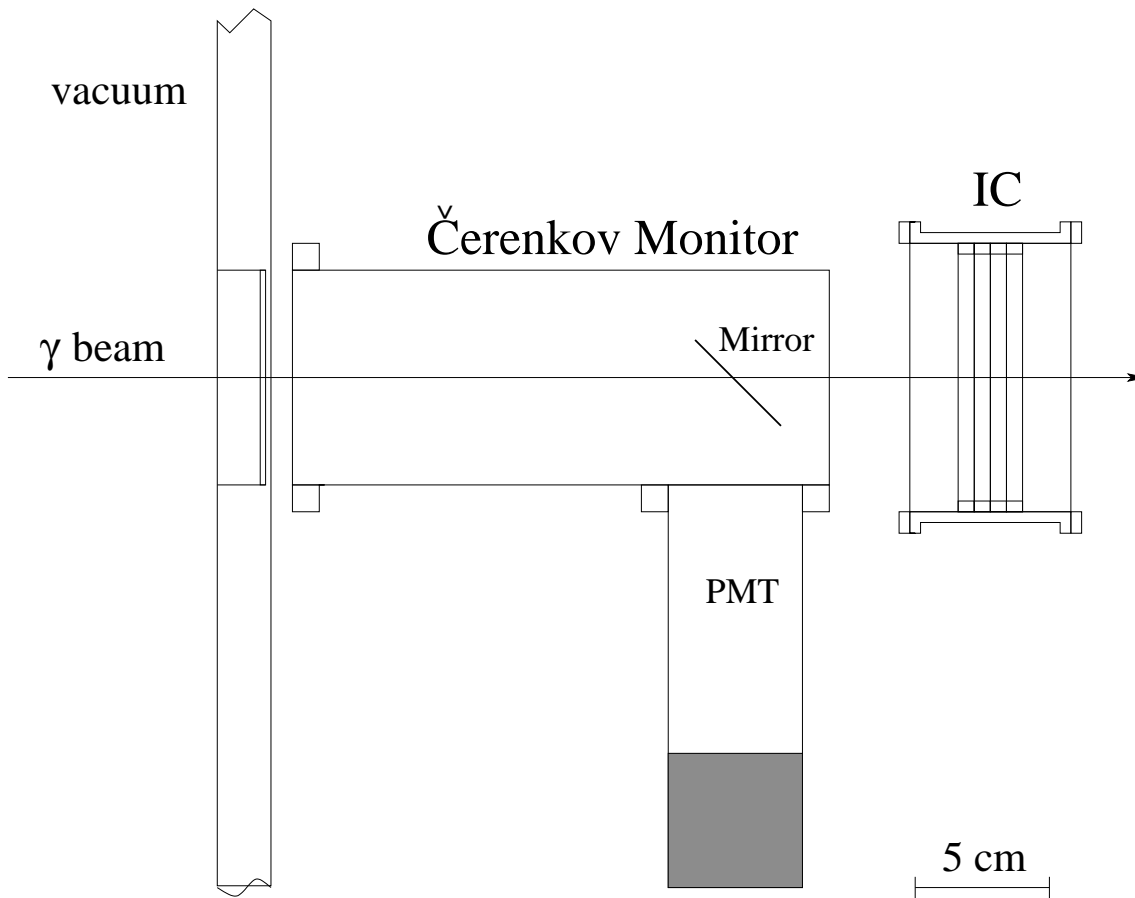
Conceptual Design Review  
SLAC, 24 Jun 2002

## Preliminary Detector Design:

- Beam parameters used in design:
  - bremsstrahlung photon beam
  - pulse structure: up to 300 ns wide, at  $120 \text{ s}^{-1}$
  - min/max flux:  $\sim 10^6 - 3 \cdot 10^9$  photons/pulse
  - beam geometry:  $\sigma_\rho \simeq 3 - 4 \text{ mm}$ ;
  - $x$ - $y$  collimation:  $\pm 8 \text{ mm}$ .
- Initial Čerenkov monitor parameters:
  - gas filled:  $\text{CO}_2$  or  $\text{N}_2$ ;  $\sim 20 \text{ MeV}/c$  threshold
  - 20 cm long, 8 cm diameter
  - $\sim 1 \text{ p.e.}/(\text{beam } e)$  with  $\sim 50\%$  light collection
  - with  $\sim 0.01 X_0$  at high  $\gamma$  flux:  $\sim 10^7 \text{ p.e.}/\text{pulse}$
  - with  $\sim 0.03 X_0$  at low  $\gamma$  flux:  $\sim 10^4 \text{ p.e.}/\text{pulse}$
- Initial IC parameters:
  - filled with  $\text{N}_2$  gas; four cells with 7 mm gap
  - 6 cm long,  $10 \times 10 \text{ cm}$  wide  $\times$  high
  - $\sim 0.5 \text{ pC}/\text{beam pulse}$  (at low  $\gamma$  flux)
  - $\sim 1 \text{ nC}/\text{beam pulse}$  (at high  $\gamma$  flux)

(Both counters to be bubbled with gas at room temp. and pressure.)

# Schematic Layout of the Čerenkov and Ion Chamber Monitors



Status as of 20 June 2002:

- Initial design calculations indicate acceptable operating conditions, compatible with readout using CAEN model V792 QDC, and model A992 Impedance adapter.
- Currently ČM and IC are being simulated in GEANT 4, which may lead to minor design changes. There is comfortable room for adjustment of parameters in either direction.
- Construction of the counters is planned to follow Monte Carlo simulations, later in the summer of 2002.
- Detectors should be available for use and testing in beam in the fall of 2002.