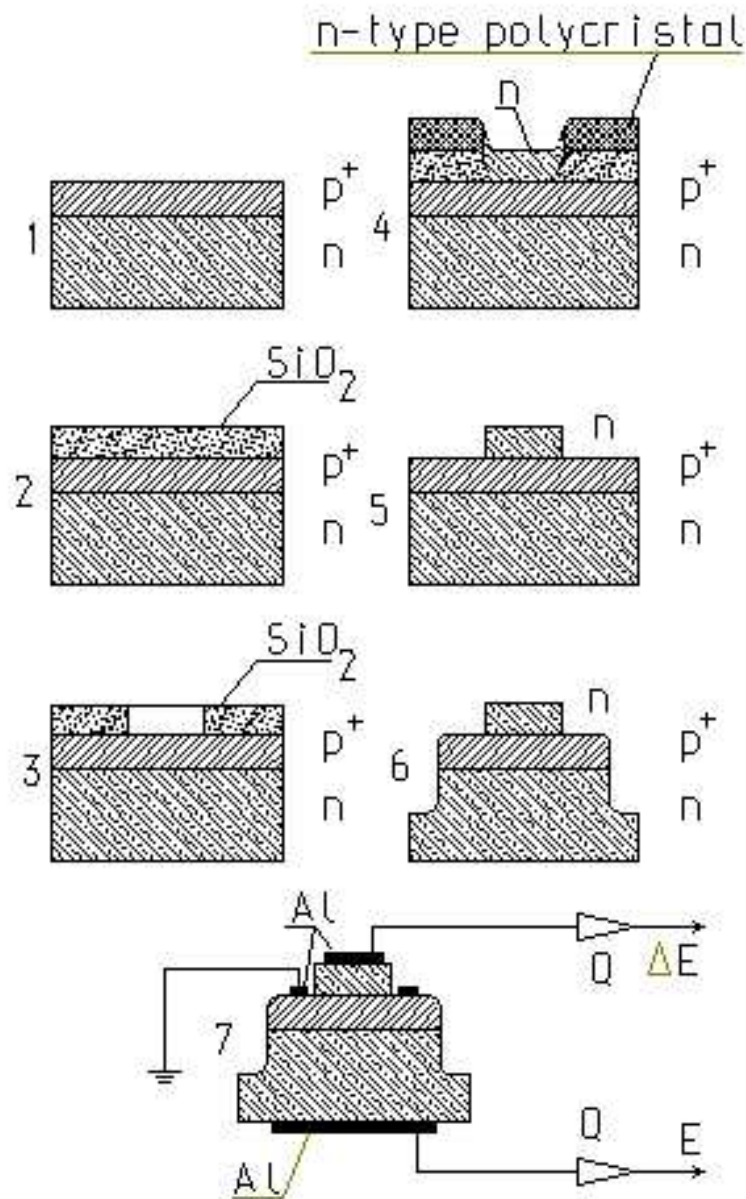


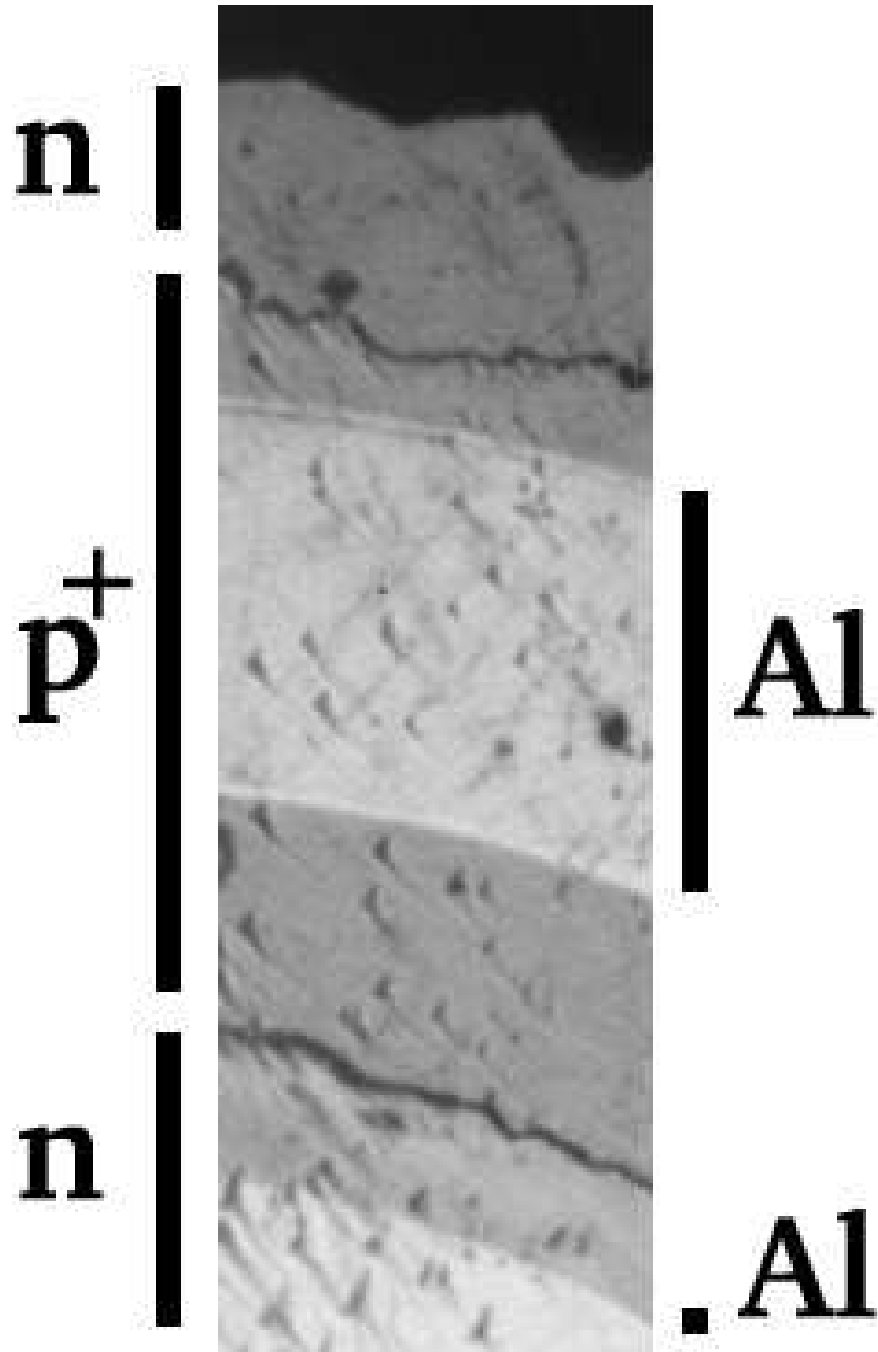
**Double sided strip monolithic  
E- $\Delta$ E telescope**

*Andrzej J. Kordyasz, Ewa Kulczycka  
Heavy Ion Laboratory, Warsaw University  
e-mail: kord@slcj.uw.edu.pl*

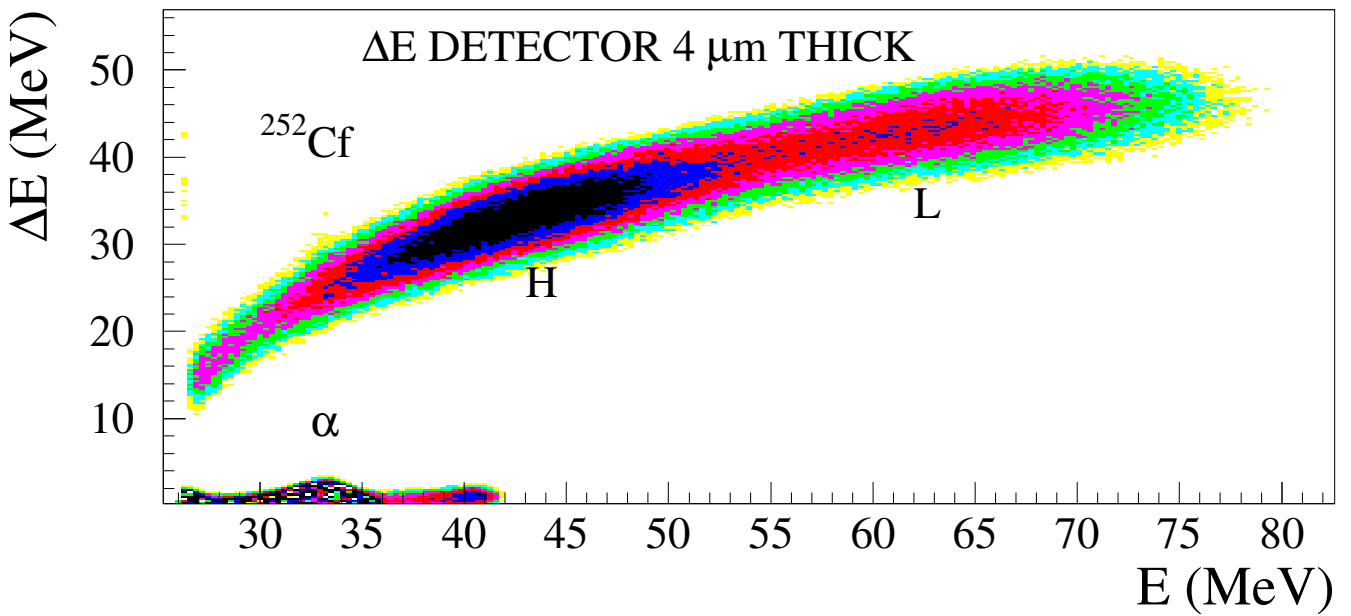
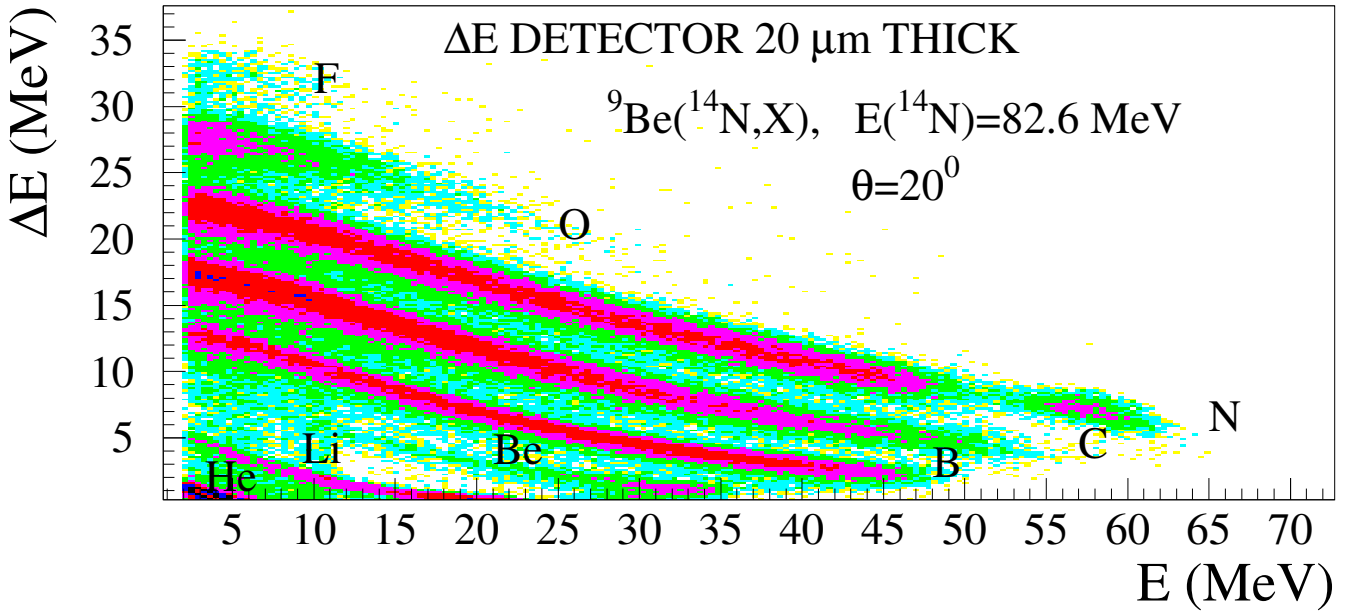
# Technological process of production of the monolithic E- $\Delta$ E telescope using QSE



Portion of the top view of the **monolithic E- $\Delta$ E telescope** (detector edge region)



# E- $\Delta E$ scatter plots

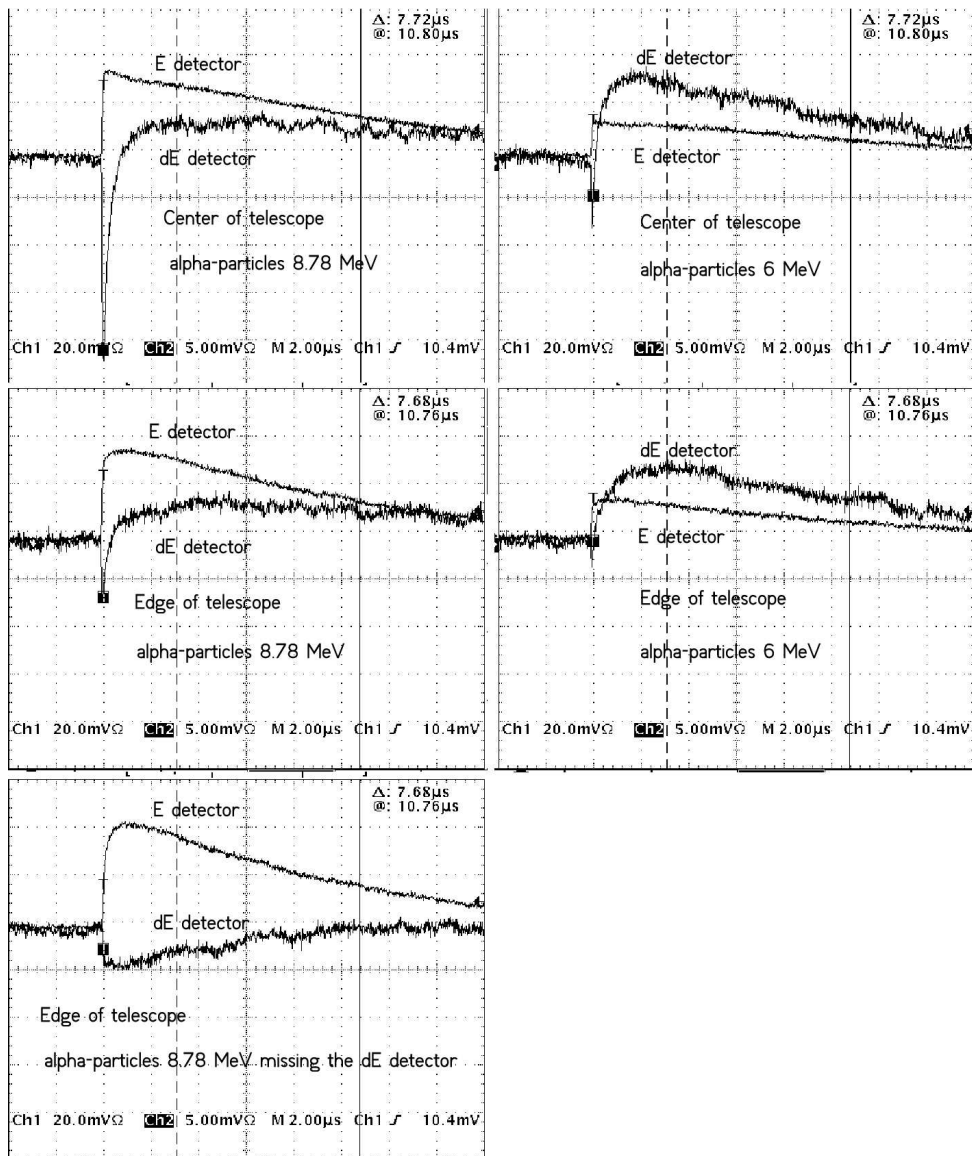


Monolithic E- $\Delta E$  telescope with 20  $\mu\text{m}$  thick  $\Delta E$  detector irradiated by  $\alpha$ -particles. Left column  $E_\alpha = 8.78 \text{ MeV}$ , Right column  $E_\alpha = 6 \text{ MeV}$ .

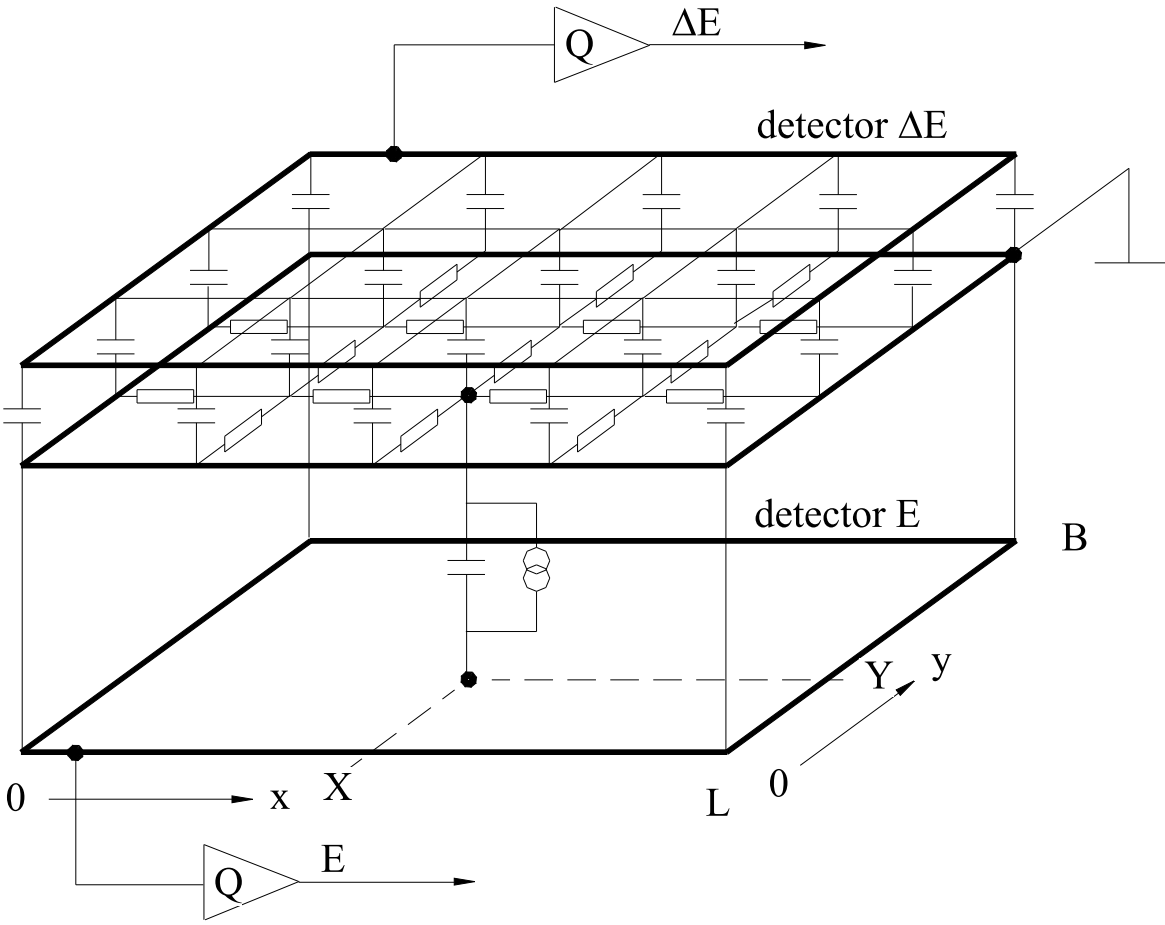
Upper row:  $\alpha$  hits center of telescope.

Middle row:  $\alpha$  hits the  $\Delta E$  detector edge.

Lower row:  $\alpha$  missing the  $\Delta E$  detector.



The structure and the equivalent circuit of a monolithic E- $\Delta$ E telescope in the orthogonal symmetry. A primary pulse for the cross-talk signal is generated in the E detector by an instantaneous current source discharging a corresponding capacitor. Weak primary  $\Delta$ E pulse is not considered here.



The average induced potential is described by the telegraphic equation for an RC network of a rectangular detector:

$$\frac{\partial^2 U}{\partial x^2} + \frac{\partial^2 U}{\partial y^2} = RC \frac{\partial U}{\partial t} \quad (1)$$

with initial conditions ( $t = 0$ ):

$$U = 0 \text{ for } x \neq X \text{ or } y \neq Y$$

$$U = V_0 \text{ for } x = X \text{ and } y = Y.$$

and the Dirichlet boundary conditions with potential  $U = 0$  at the detector edges:

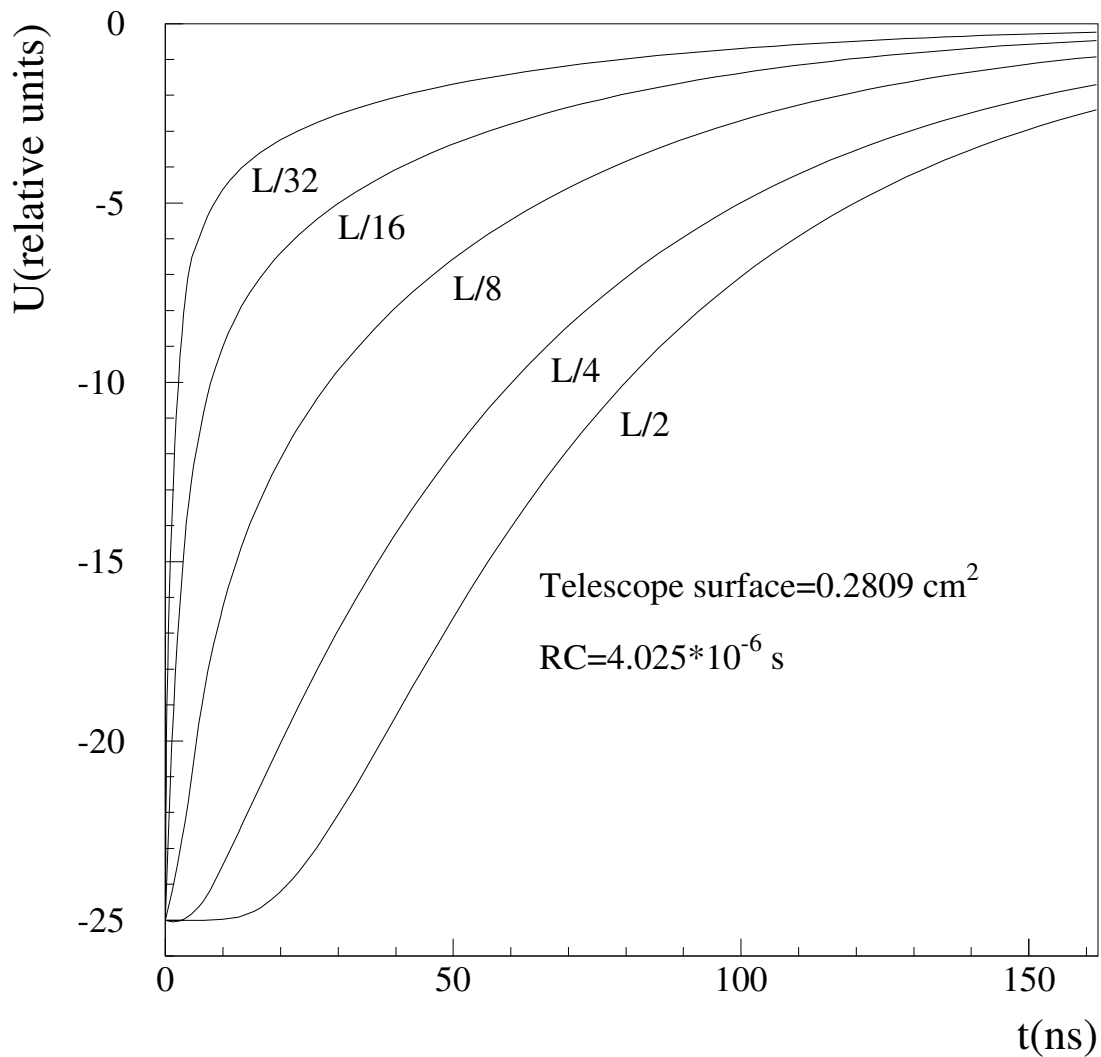
$$U = 0 \text{ for } x \in [0, L] \text{ with } y = 0 \text{ or } y = B$$

$$U = 0 \text{ for } y \in [0, B] \text{ with } x = 0 \text{ or } x = L$$

where

$U$  = voltage;  $t$  = time;  $R$  = sheet resistance ( $\Omega$ );

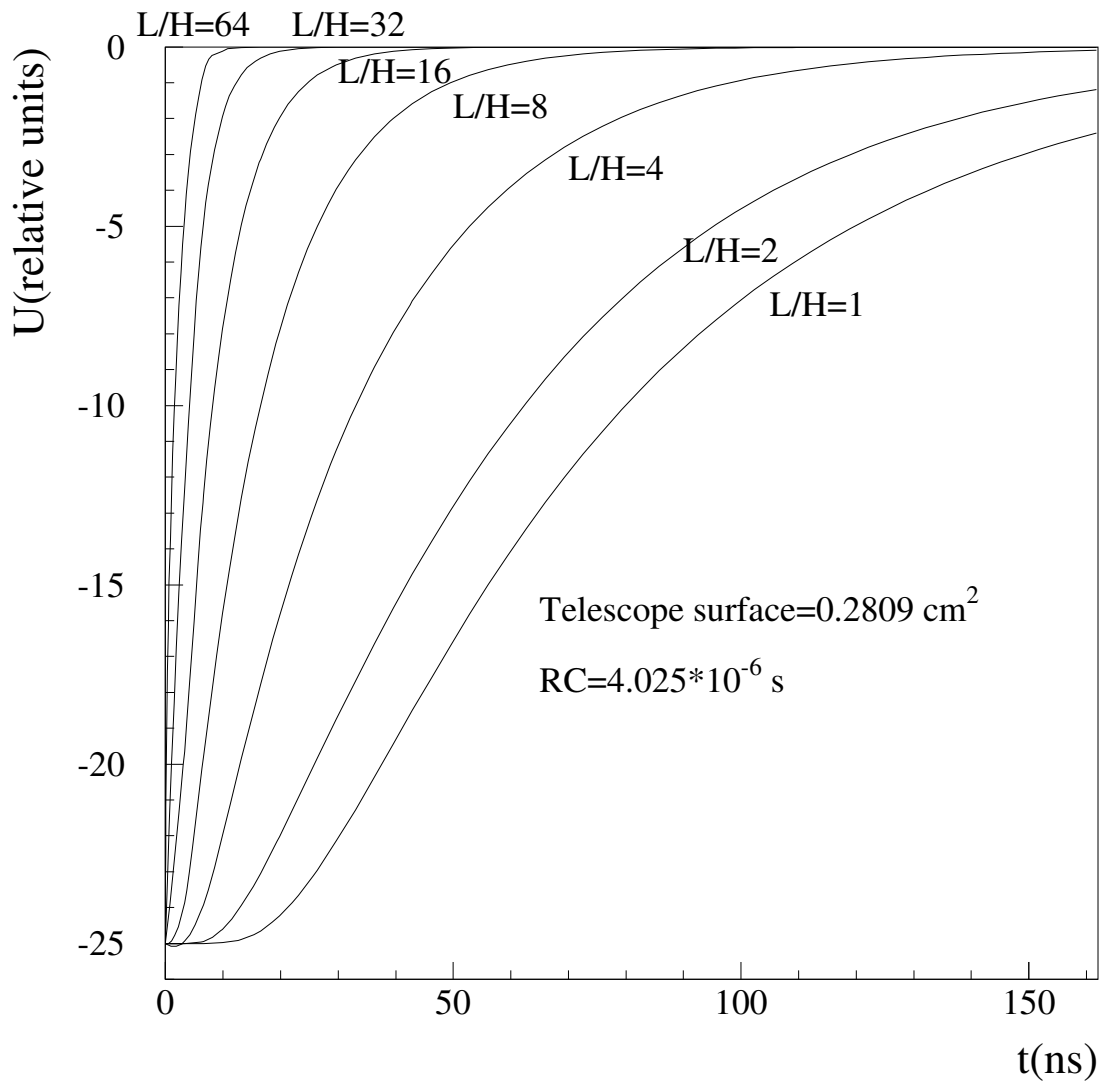
$C$  = capacity per unit area ( $pF/cm^2$ ).



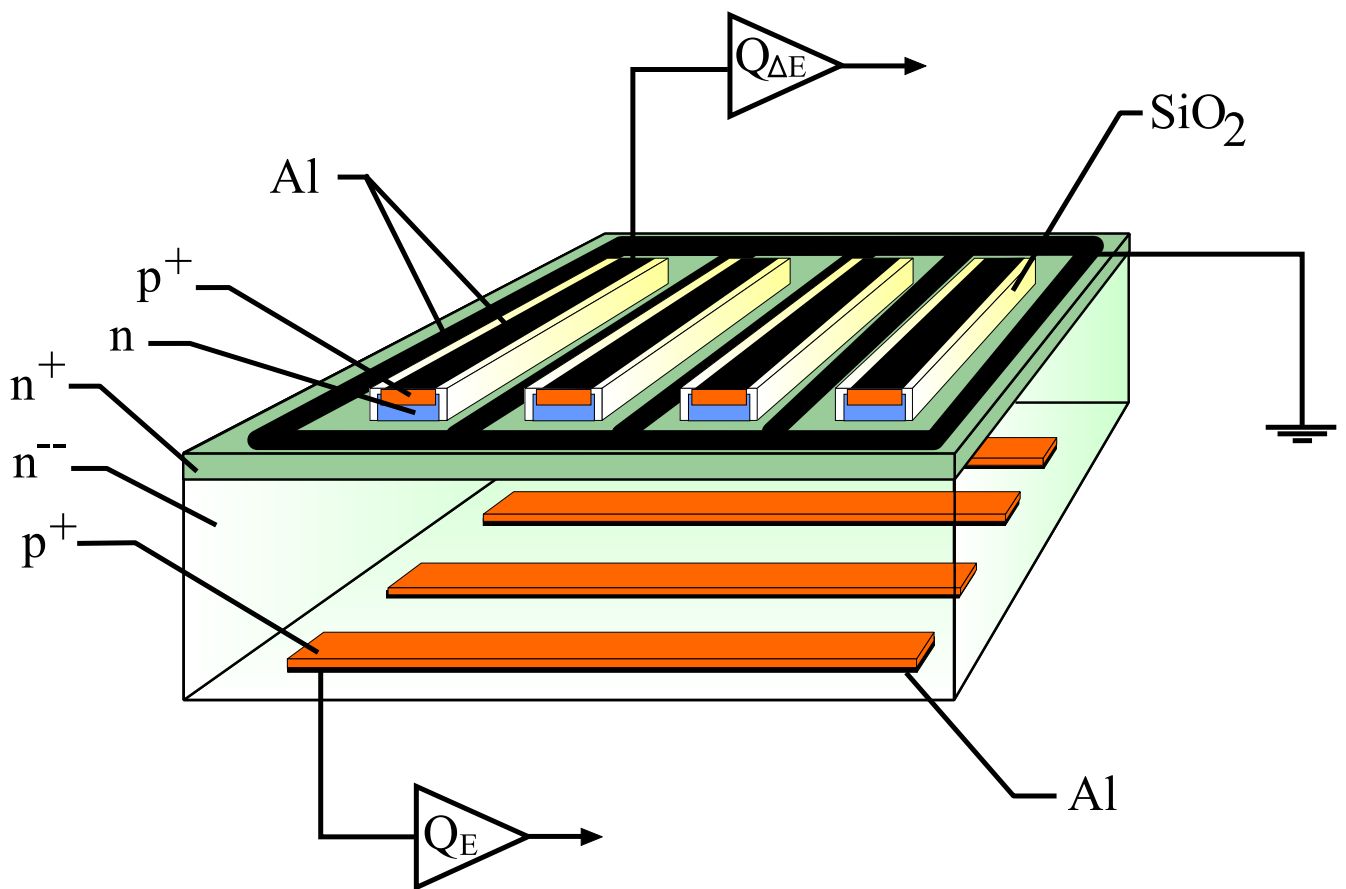
Average potential versus time for square monolithic E- $\Delta$ E telescope ( $L=B=0.53$  cm). Initial positions of sources cross-talk potential were localized at following values of X: L/2, L/4, L/8, L/16, L/32 and the constant value of  $Y=B/2$ .



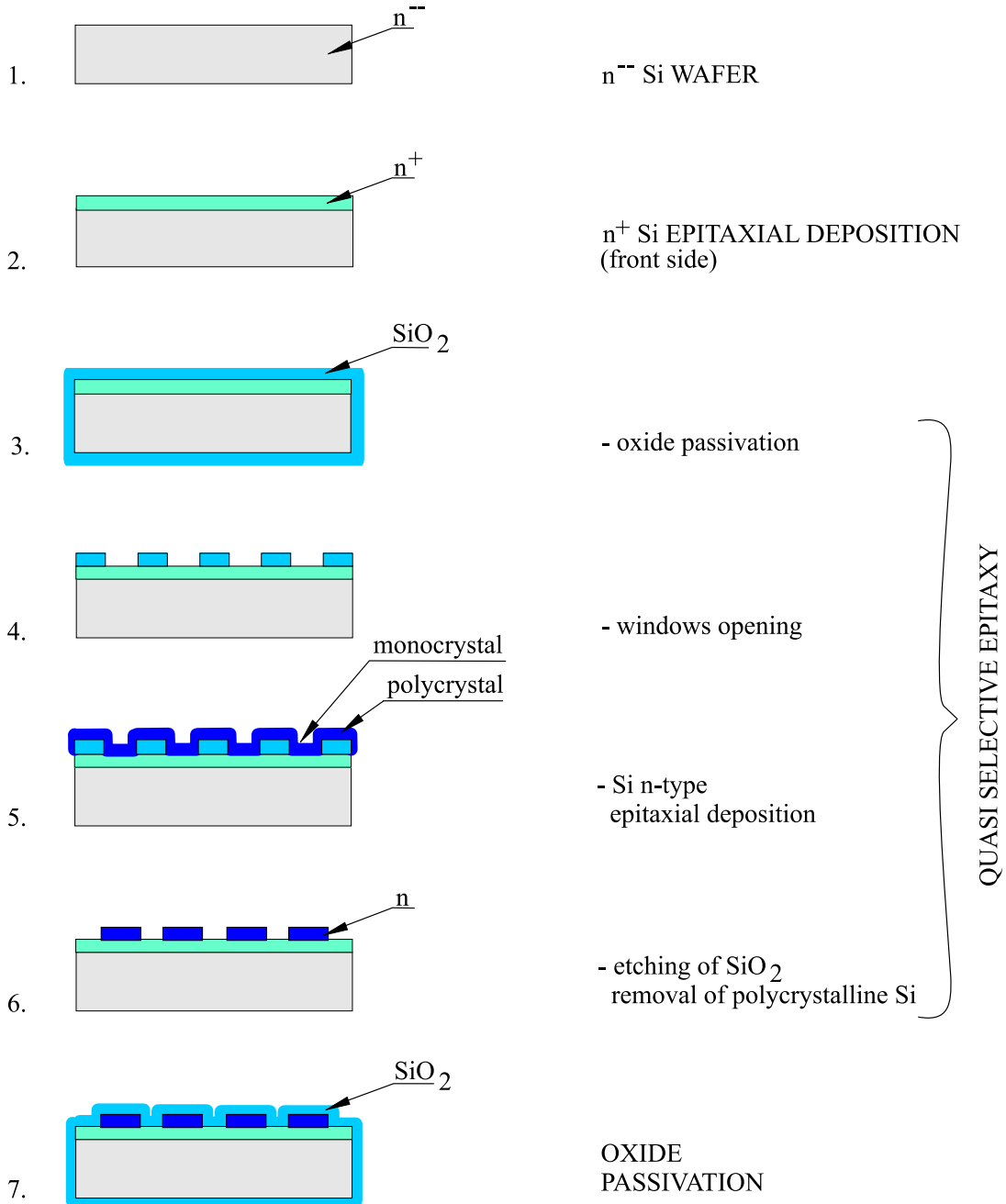
Average potential versus time for different rectangular telescope shapes L (length) and H (height).

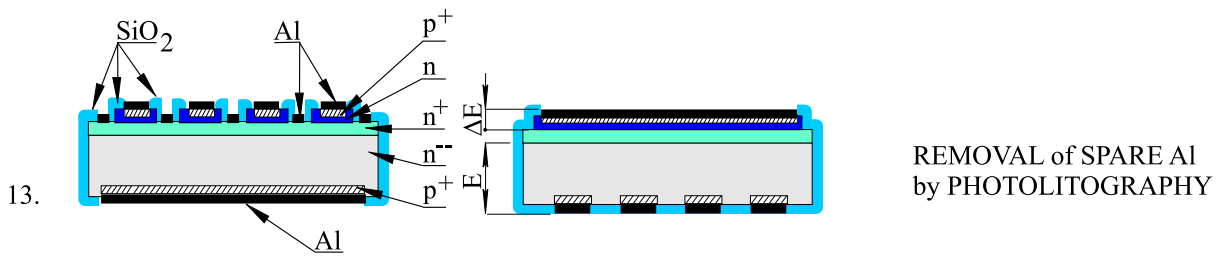
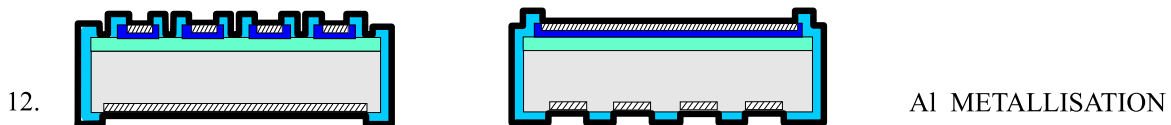
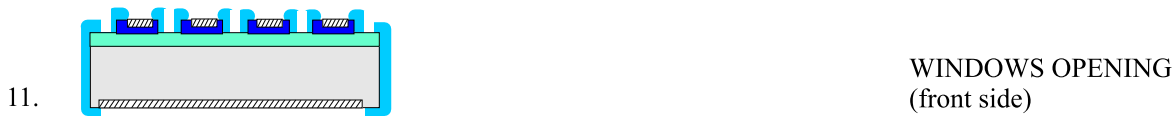
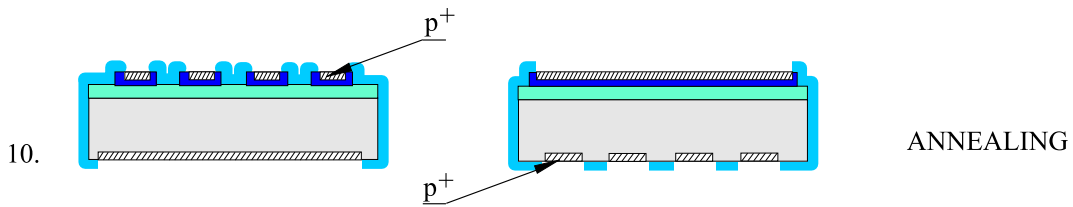
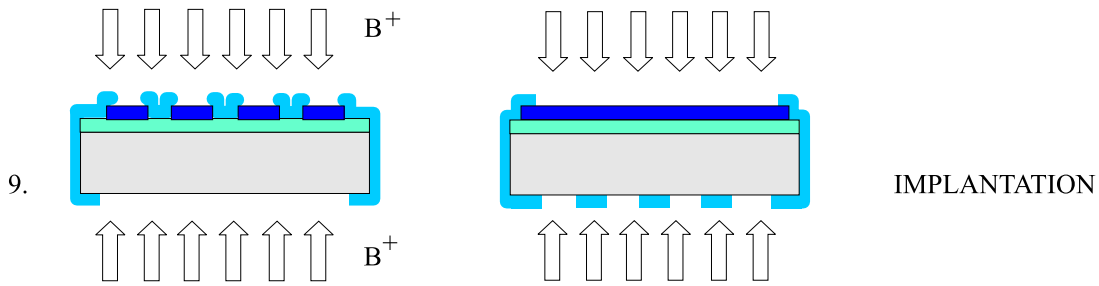
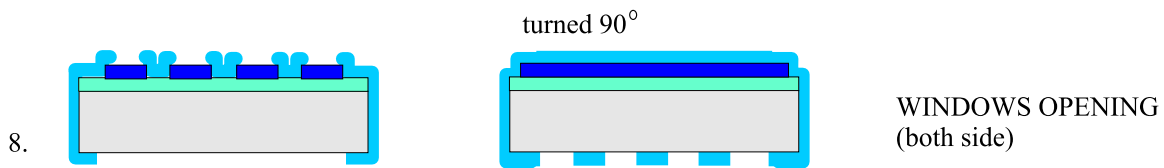


Double sided strip matrix  
monolithic E- $\Delta$ E telescopes  
produced by the  
Quasi-Selective Epitaxy



# Technological Process of Double sided strip matrix monolithic E- $\Delta$ E telescopes





front side (upper in above Figs)

back side

