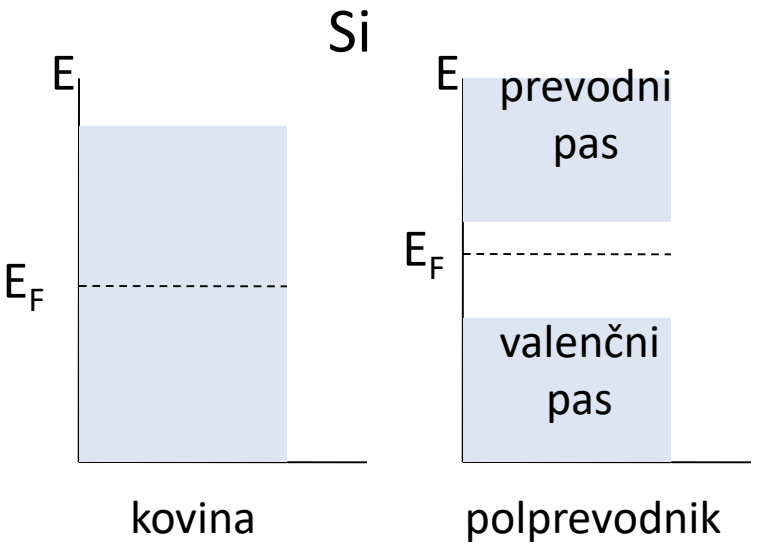
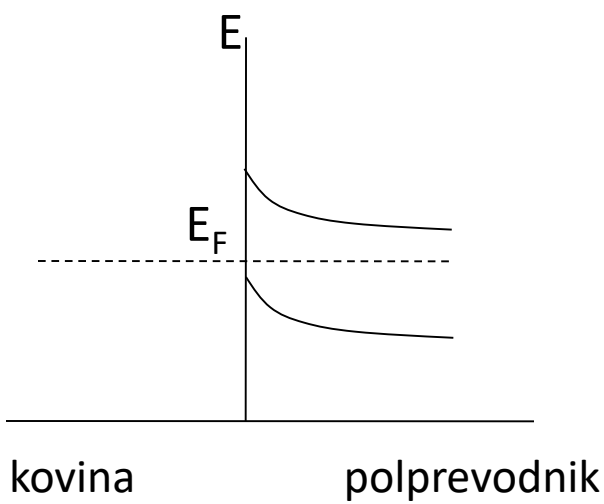
Detektorji s površinsko barijero





- deplet. plast do 5 mm
  (celoten detekt. lahko deplet.)
- občutljivost na vidno svetlobo (2 eV- 4 eV)
- dobra energ. resolucija (Fano faktor)
- α spektroskopija

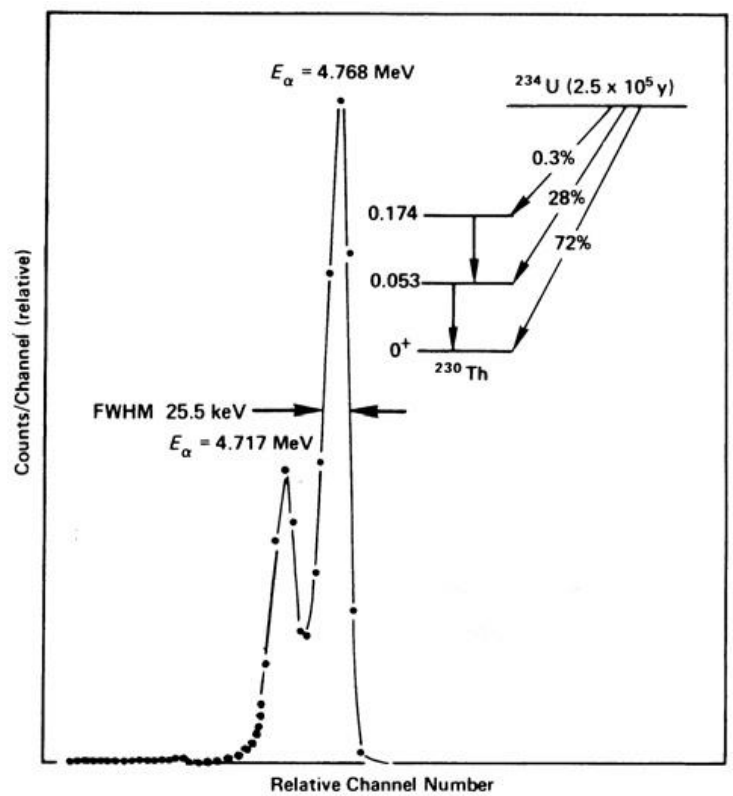


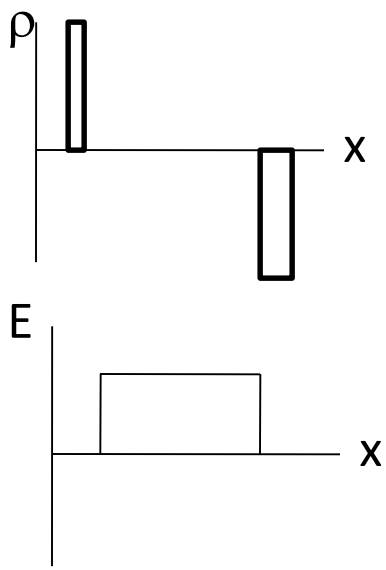
Fig. 4.6. Typical Alpha Spectrum from ^{234}U Showing Alphas from the Two States in ^{230}Th.

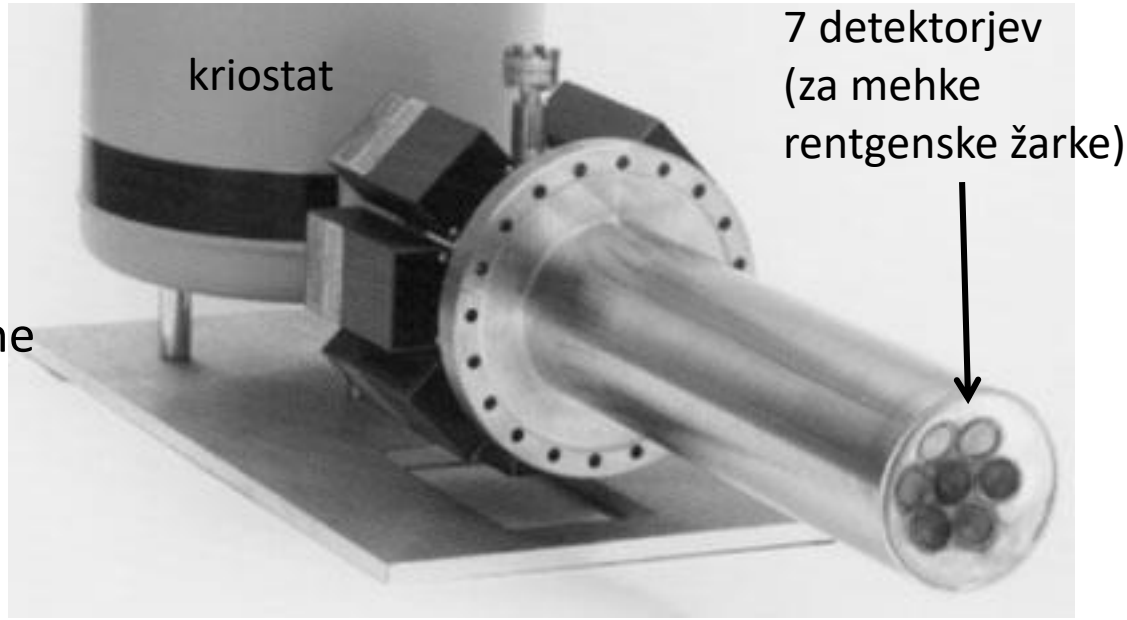
σ_E/E ~10 keV/4,8 MeV ~ 0,2%

Si(Li) števci

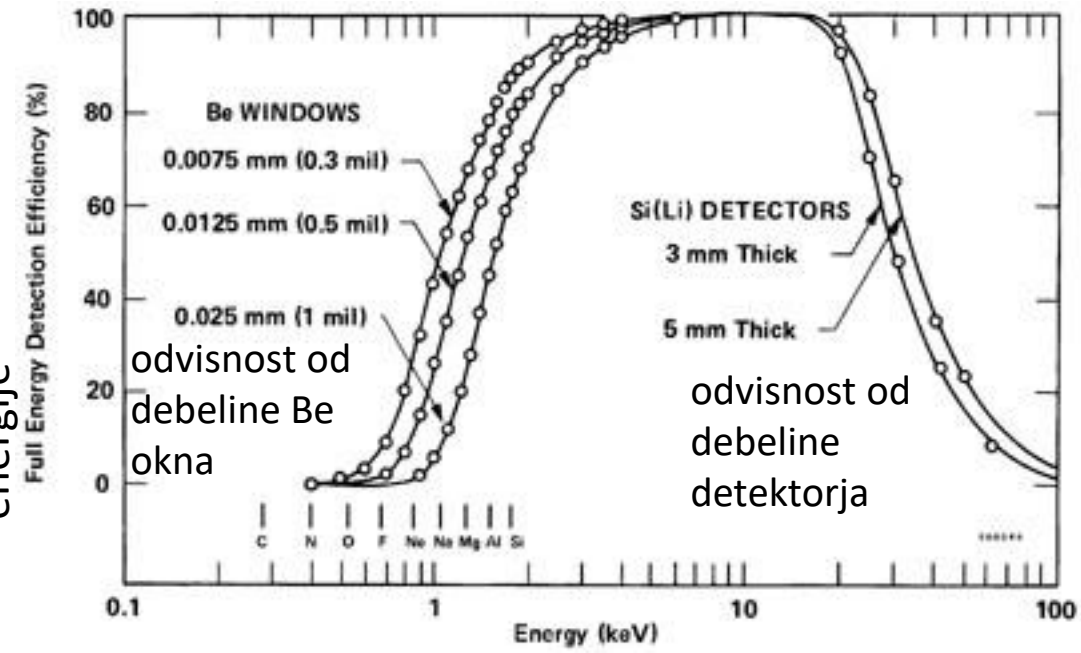
- kompenziran polprevodnik;
- debelina kompenzirane plasti lahko 10 mm - 15 mm, podobne lastnosti kot depletirana plast

p-tip i-tip n-tip
(kompenziran)





izkoristek za popolno detekcijo energije

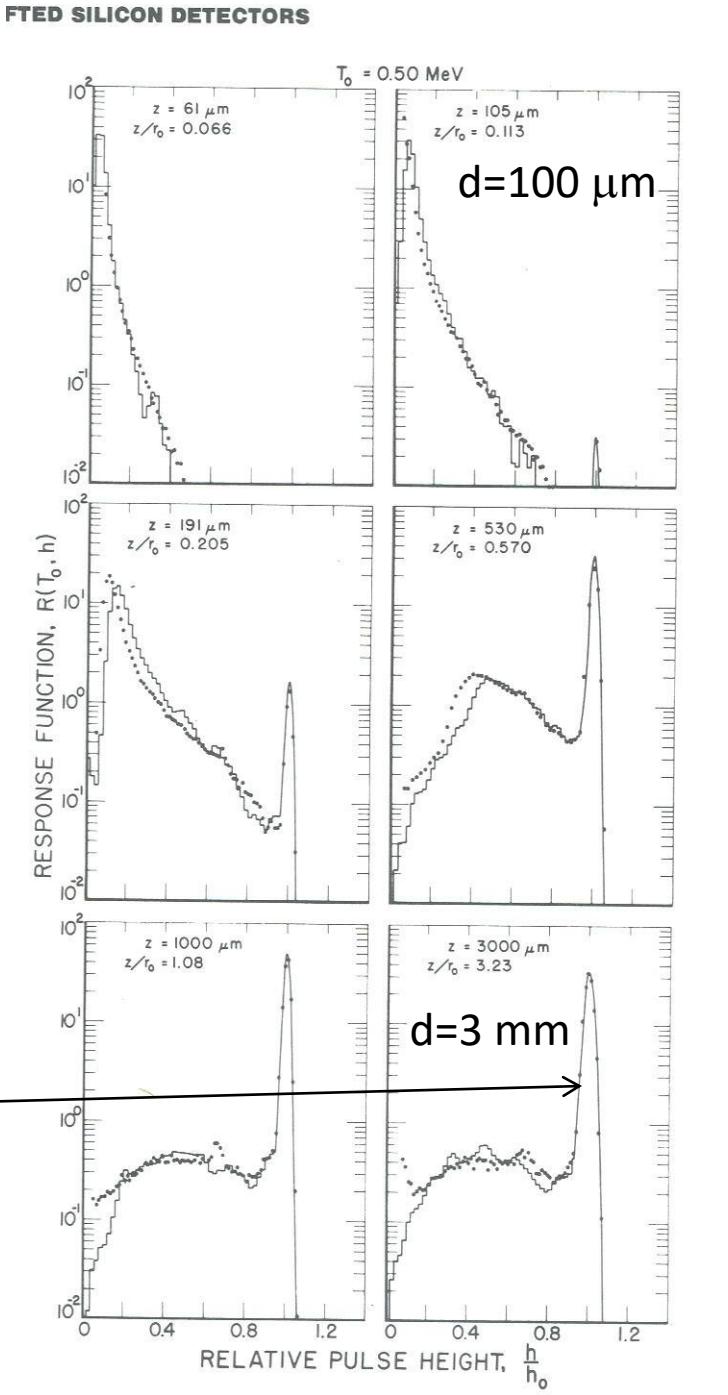


Si(Li) števci

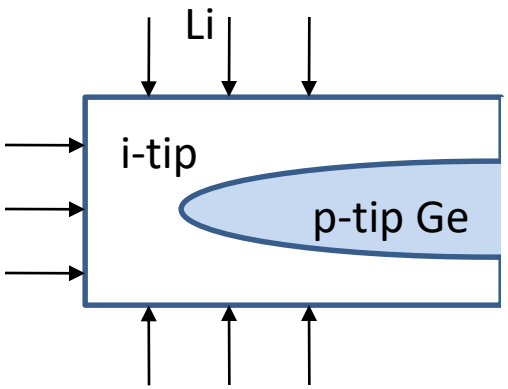
β spekter (T_β=0,5 MeV)
v odvisnosti
od debeline detektorja

- potrebno hlajenje - tekoči dušik (velika debelina komp. plasti - velik termični šum; preprečevanje dodatne difuzije Li ionov)
- detekcija mehkih rentgenskih žarkov
- β spektroskopija, $T_\beta \sim$ 0,15 MeV - 5 MeV (zadostna debelina detektorja, majhen Z - malo povratnega sipanja)

vrh popolne absorbpcije

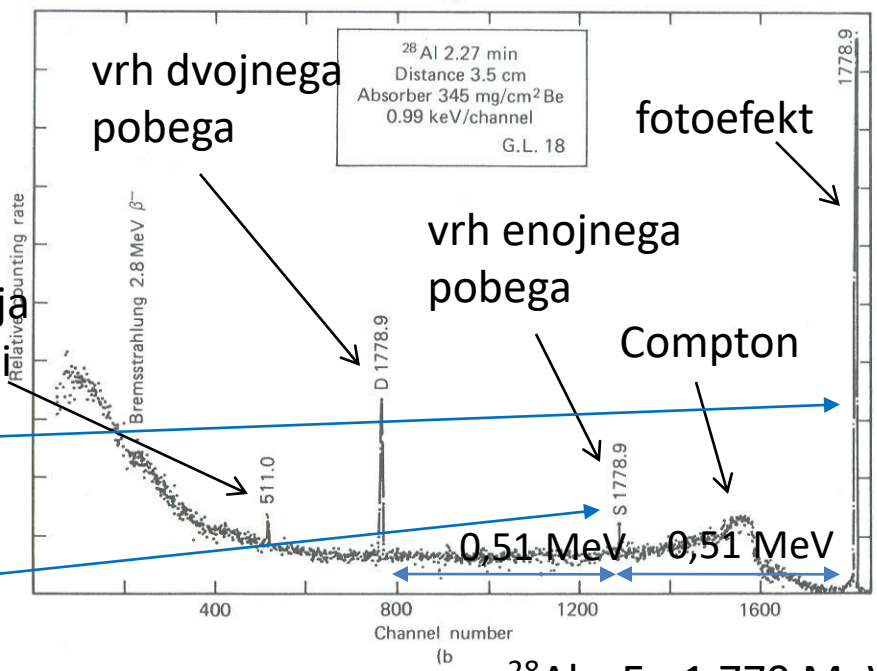


Ge(Li) števci



$\sigma_E/E = \sqrt{(Fw/E)}$
w(Ge, 77 K) = 3 eV
F ~ 0,15
σ_E(E=1 MeV)=0.7 keV
σ_E x2 zaradi prispevkov termičnega šuma, elektronike,...

- hlajenje (E_g^{Ge}, Li ioni)
- velika aktivna prostornina detekt.
- detekcija prodornih delcev (Z_{Ge}=32)
- spektroskopija γ žarkov



$$\gamma\, Si \rightarrow e^-\, Si^+$$

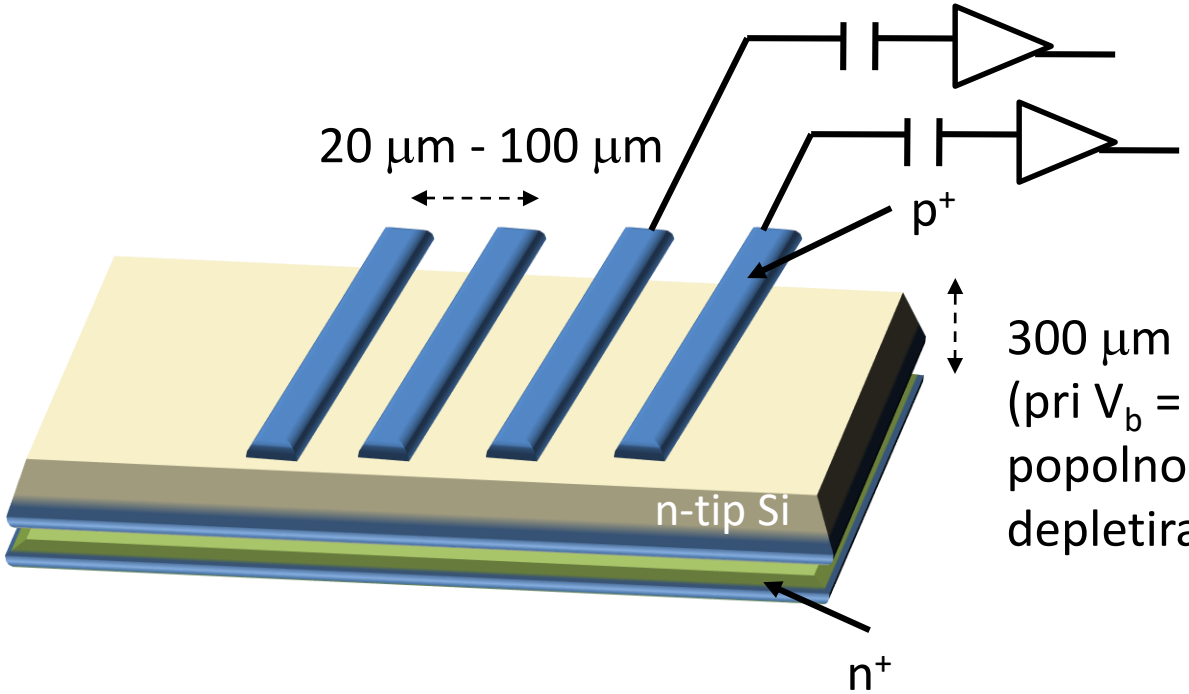
$$\gamma \rightarrow e^-\, e^+$$

$$e^+ e^- \rightarrow \gamma\gamma$$

^{28}Al γ E_γ=1.779 MeV

Pozicijsko občutljivi Si detektorji

mikropasovni detektor (*Si microstrip detectors*)



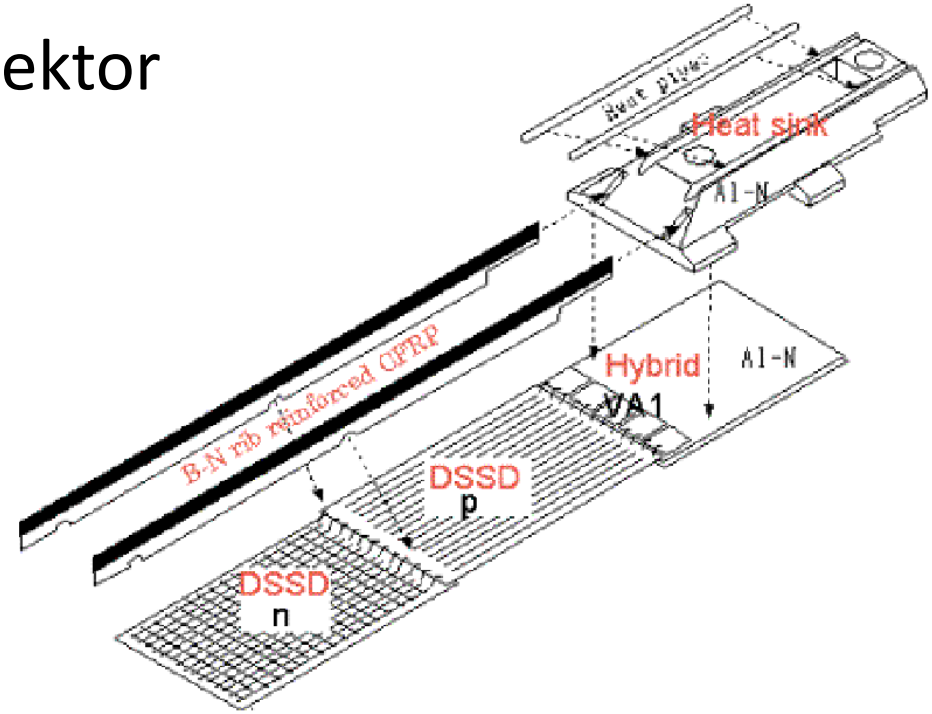
- princip delovanja podoben VŽPK
- zadošča branje vsakega 2-3 pasu
- majhna debelina
  (sledilni det., ne meritev E)
- celoten depletiran, velika
  hitrost zbiranja naboja

segmentacija n^+,
pasovi v pravokotni smeri
$\Rightarrow$ 2-dim pozicijska informacija

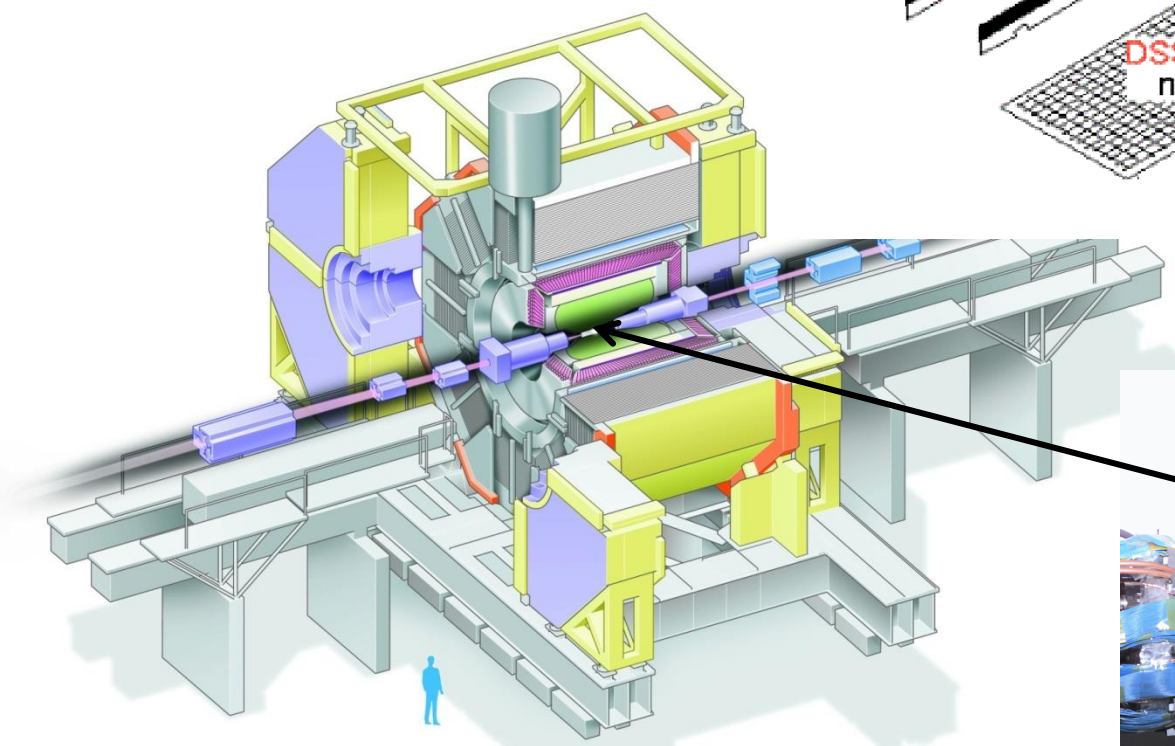
Double sided silicon strip detectors
DSSD

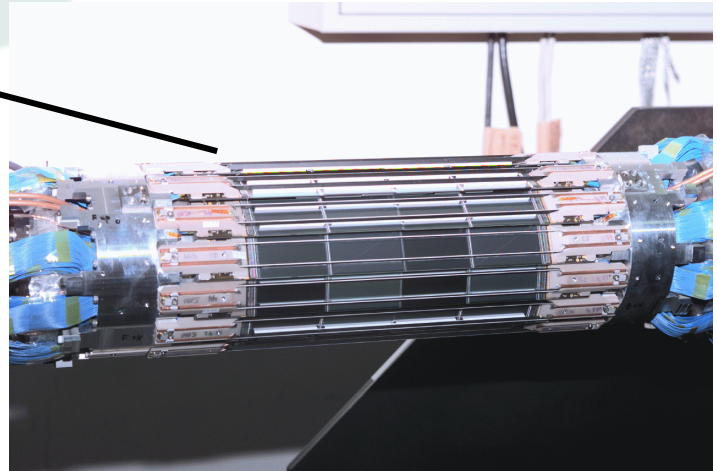
Dvostranski Si pasovni detektor

n^+ stran tudi segmentirana
(kot p^+ pasovi)
v pravokotni smeri glede na p^+



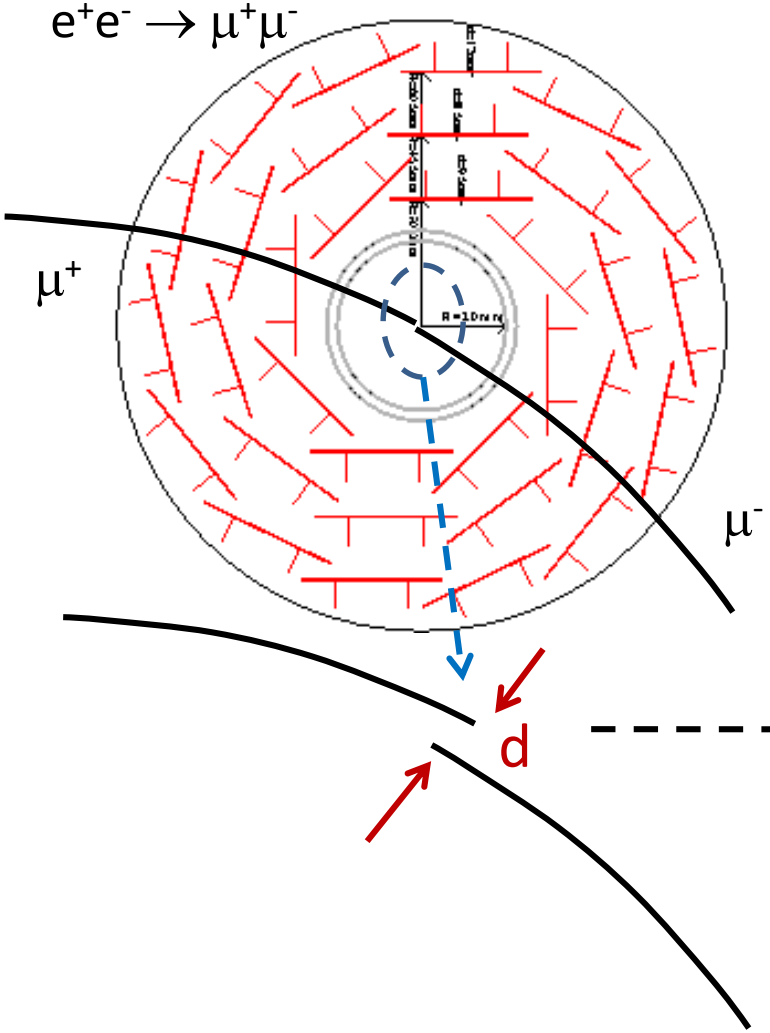
Belle

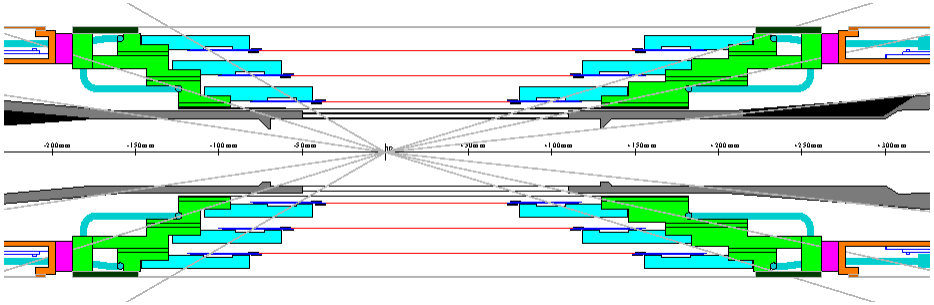




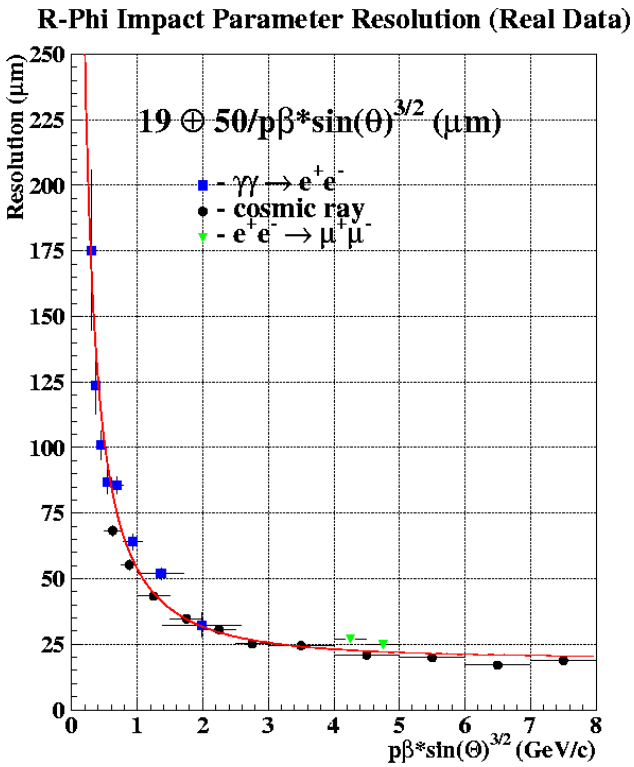
Dvostranski Si pasovni detektor Belle

$e^+e^- \rightarrow \mu^+\mu^-$



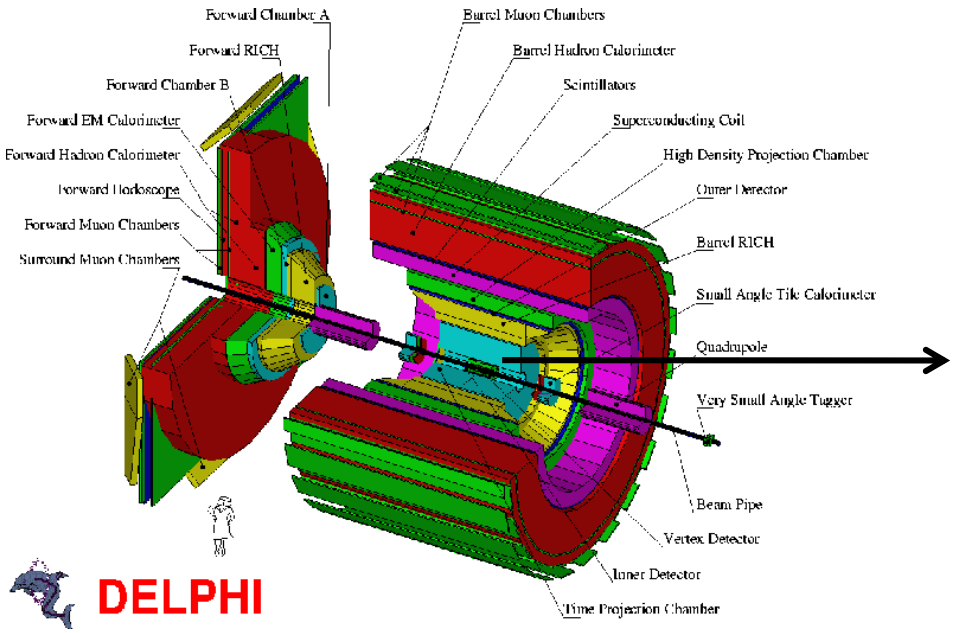


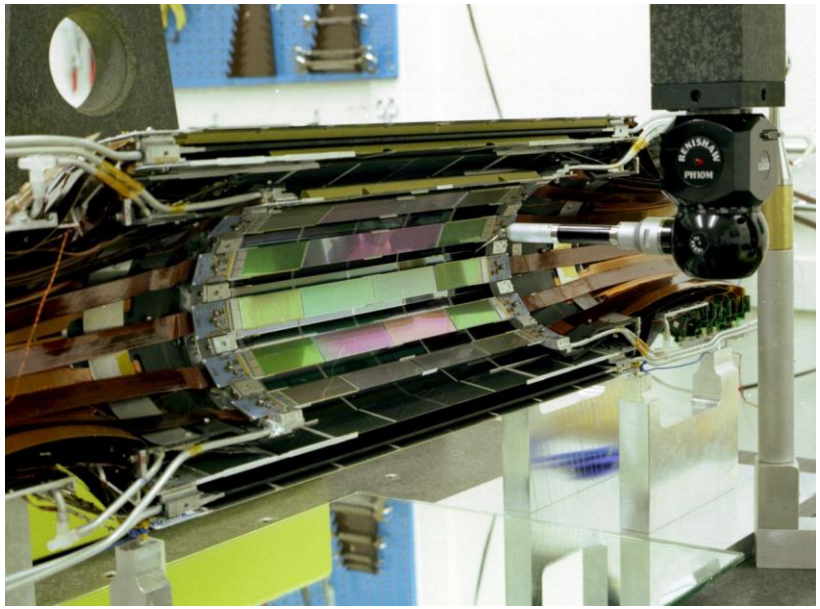
σ_d [μm]

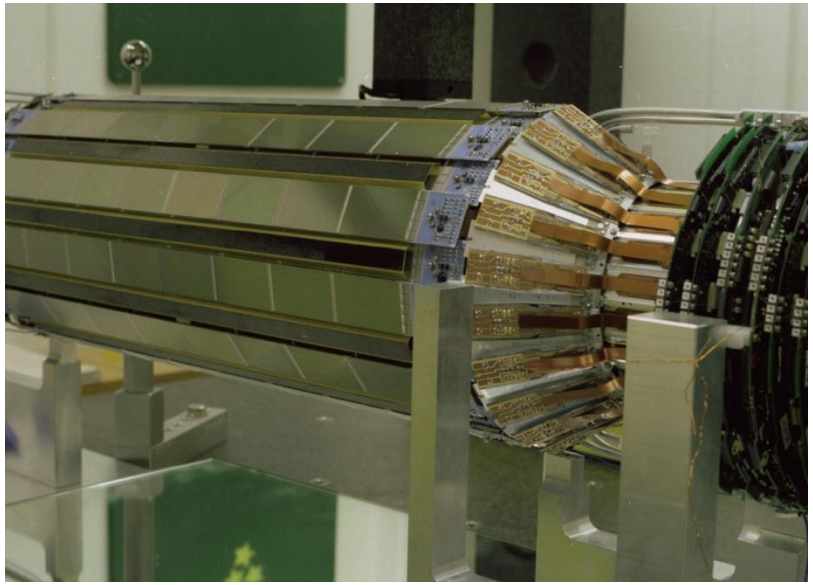


p_t [GeV/c]

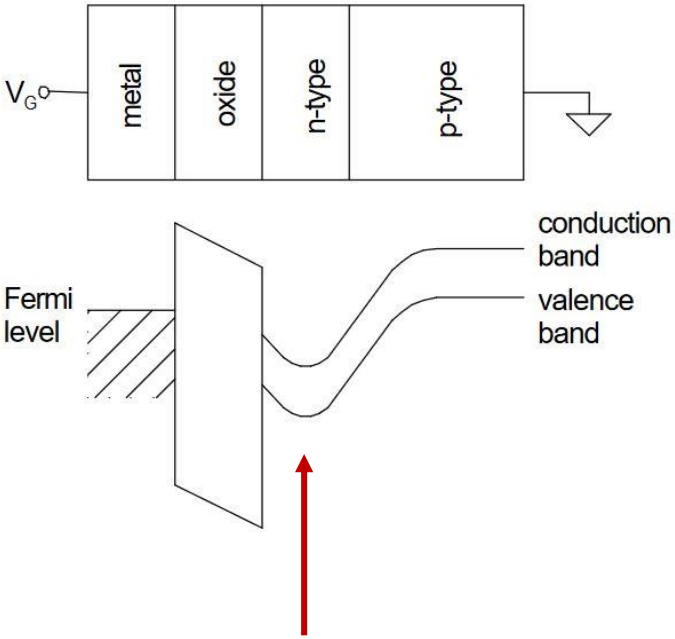
Dvostranski Si pasovni detektor Delphi





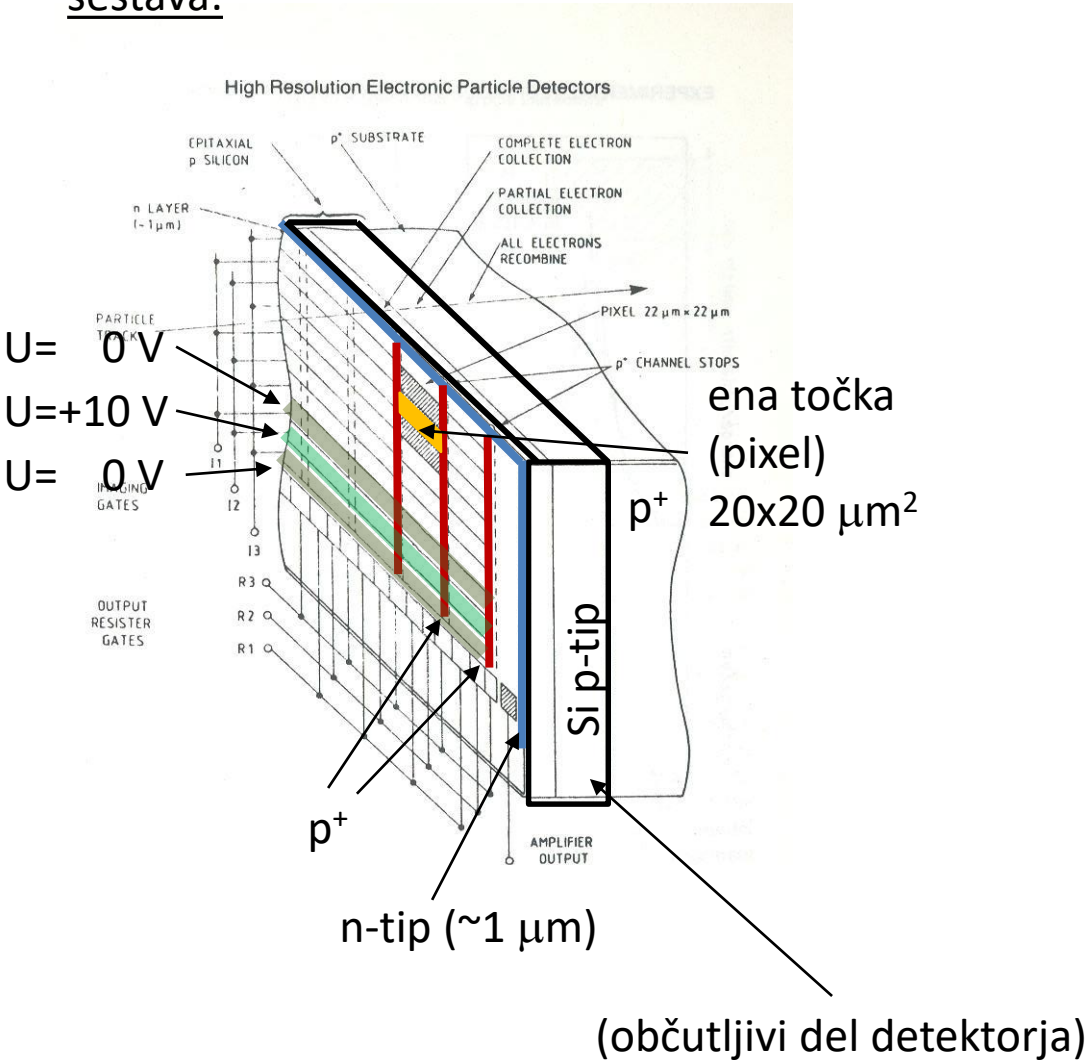


CCD
(Charged Coupled Device)



minimum potenciala!

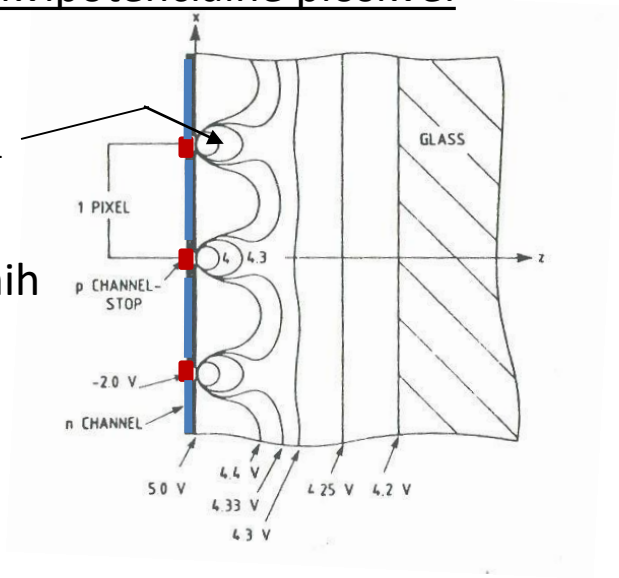
sestava:



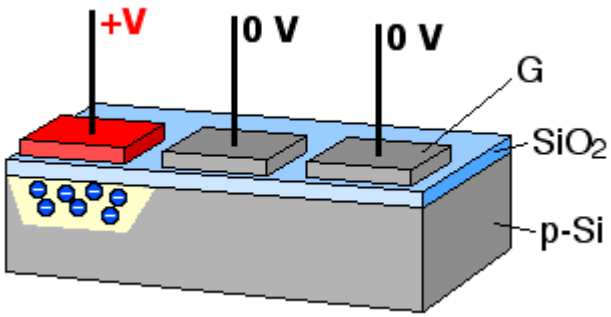
CCD
(Charged Coupled Device)

ekvipotencialne ploskve:

sproščeni e^- so ujeti v pontencialnih votlinah

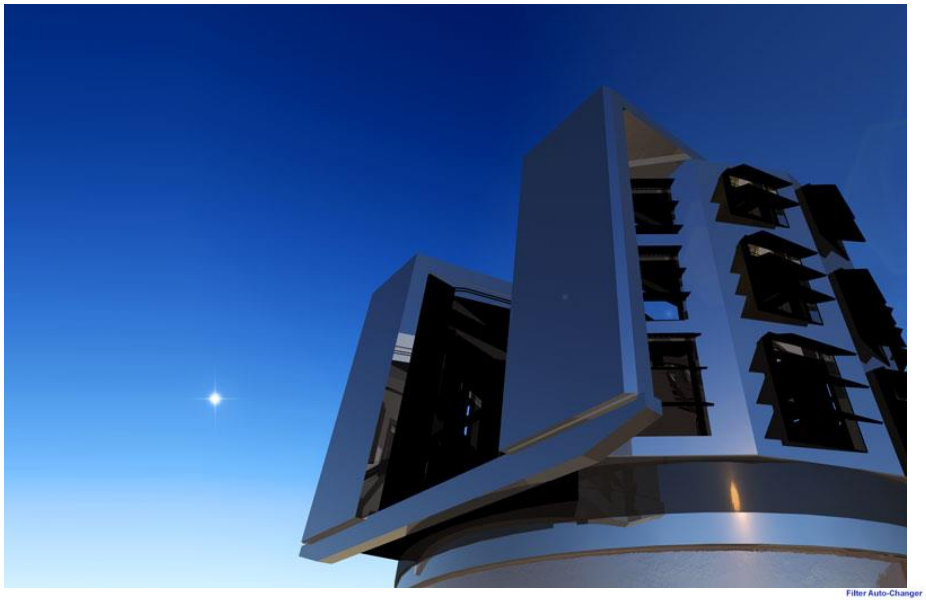
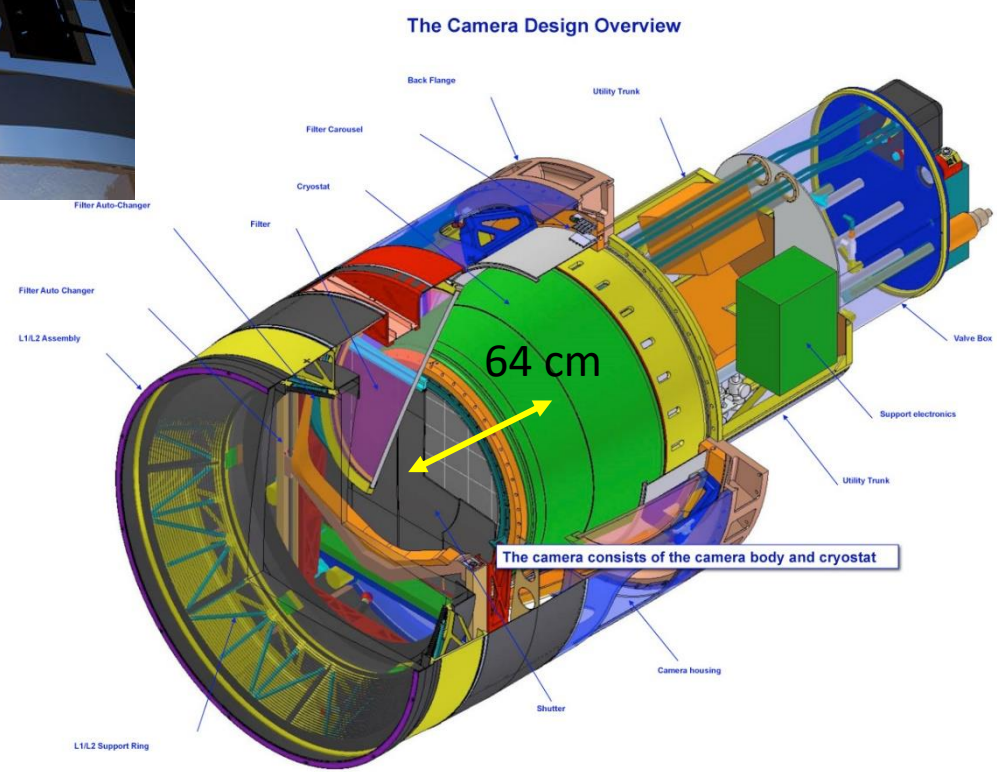


Branje signala:



z izmeničnim spreminjanjem nap. na elektrodah ujete e^- pomikamo proti koncu det.

CCD
(Charged Coupled Device)



Large Synoptic Survey Telescope (LSST) being built in Chile