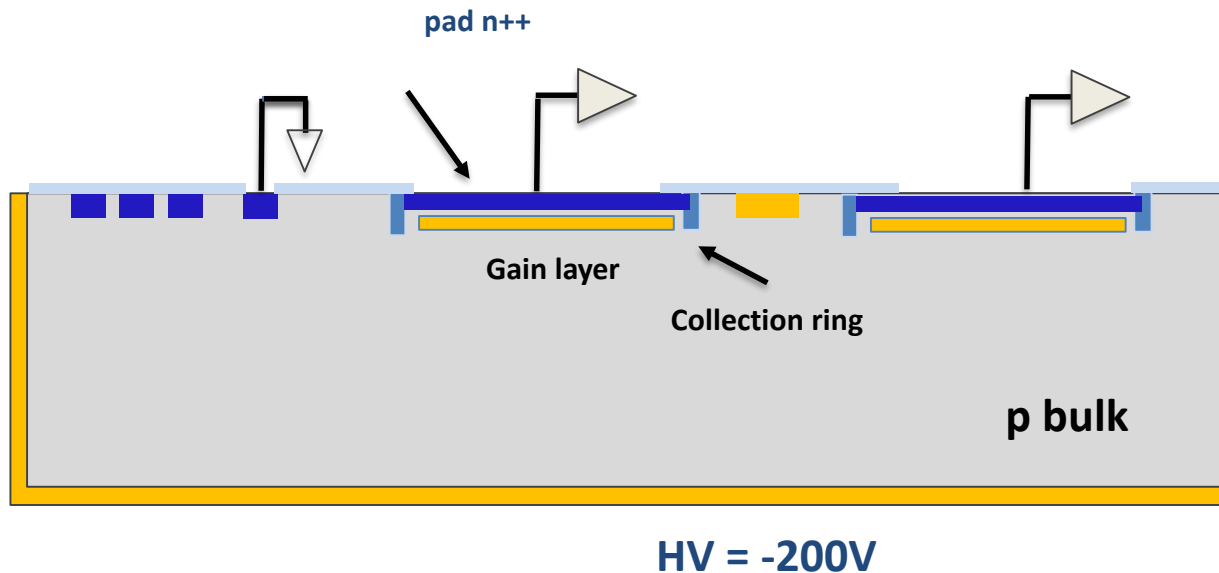


PRECISION TIMING DETECTOR FOR IN TIME PARTICLES



PRIORITY NUMBER:

102016000092430

KEYWORDS:

Particle Detector

UFSD

Charge Particles Tracking

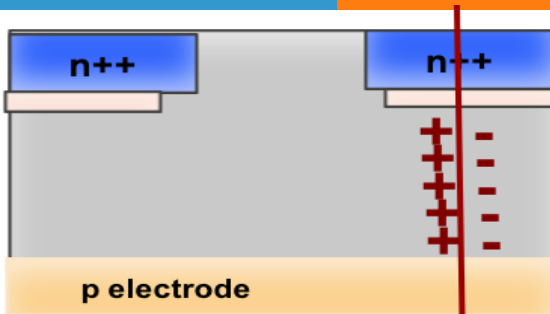
Protection Ring

Delay Time

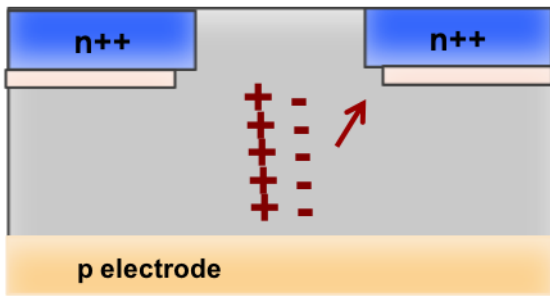
Detector with innovative geometric configuration of the components to allow timing the passage of particles with a precision of few tens of picoseconds while discarding signals that are late with respect of the time of passage of the particles. This result is achieved via the use of a special deep implant that acts as a collection ring for late charges, preventing these charges from generating large signals.



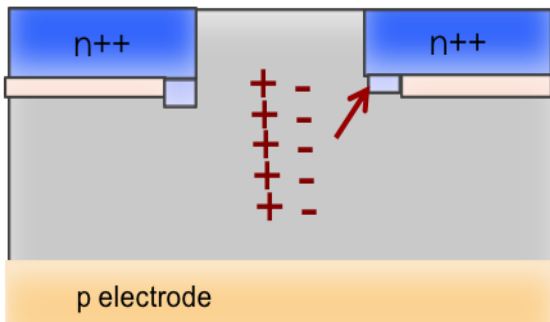
PRECISION TIMING DETECTOR FOR IN TIME PARTICLES



1. Prompt signal



2. Late signal



3. Protection ring

DESCRIPTION :

One of the problems generally concerning to particle detectors, and in particular affecting high-precision Ultra Fast Silicon Detectors (UFSD), is the ability to distinguish particles that generate delayed signals, with respect to the moment of their passage in the detector, from those in time. This can cause errors in the measure of the particles crossing time, of about 100-200 ps. This drawback can be overcome by adopting an innovative configuration, for the various components of the detector, that allows to amplify only the prompt signals. This is made possible thanks to the insertion of a protection rings which prevent the delayed charges from reaching the amplification layer, so as to be able to neglect their contribution to the total charge released, in this way minimizing detection errors.

ADVANTAGES:

- Absence of late signals;
- Uniform response;
- Excellent time resolution.

APPLICATIONS:

- Recognition of particles using their Time of flight;
- Tracking of particles in environment with very high density of particles;
- Particle counters for beam monitoring.