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How would you use a silicon device to efficiently detect photons with an energy as high as 10,000 eV? Note that the 1/e penetration depth of such a photon is about 150 microns versus a few microns for visible light photons

> Acceptable answers would be a PIN diode but recognizing the fact that the intrinsic region of the PIN diode must be thick enough to accommodate the long penetration depth of the high energy photon. A Schottky diode would also be acceptable with the same considerations.

Could you use such a device to measure the energy of an individual photon?

> Yes, using the fact that the electron created by the high energy photon has a very high kinetic energy which will be converted into a cascade of secondary electrons and can be swept out of the device as a current pulse.

What determines the response time of the detector?

> Concepts that should be understood include the time required to sweep the electrons out of the depletion region and the RC time constant of the device.

How could you make the detector faster?

> Builds on answer to previous question including reducing sweep out time with higher voltage, reducing R and C. Ideas for reducing C include shaping the electrodes to have a small back electrode that can still collect the charge.