M. Bruzzi - Proposal of activity in New Material

	SiC	GaN	Diamond	Epitaxial Si
Max thickness achievable [μm]				
Max size wafer achievable				
e-h per μm for mips				
Cce % before irr. with mips				
#e collected before irr				
#e collected after 1e15n/cm^2				
#e collected after 1e16 n/cm^2				
#e collected after 1e15 24GeV pcm^{-2}				
#e collected after 1e16 24GeV pcm^{-2}				
Annealing data …				

p-CVD ans s-CVD Diamond (Data from RD42 Status report Jan. 2006)

Polycrystalline: CEE% 0.2 at $1.8 \times 10^{16} cm^{-2}$ corresponds to 2160e if a 300μm ccd is reached before irradiation.

Single crystal: CCE % 0.32 at $5 \times 10^{15} cm^{-2}$ corresponds to 5760e if a 500μm ccd is reached before irradiation.

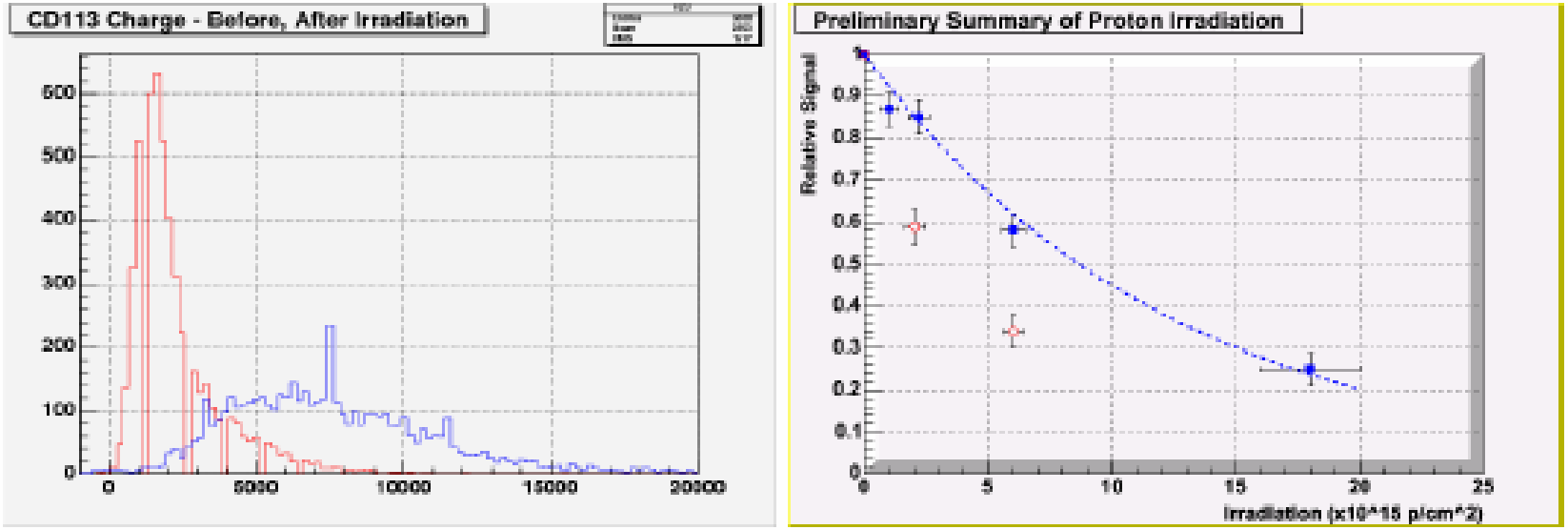
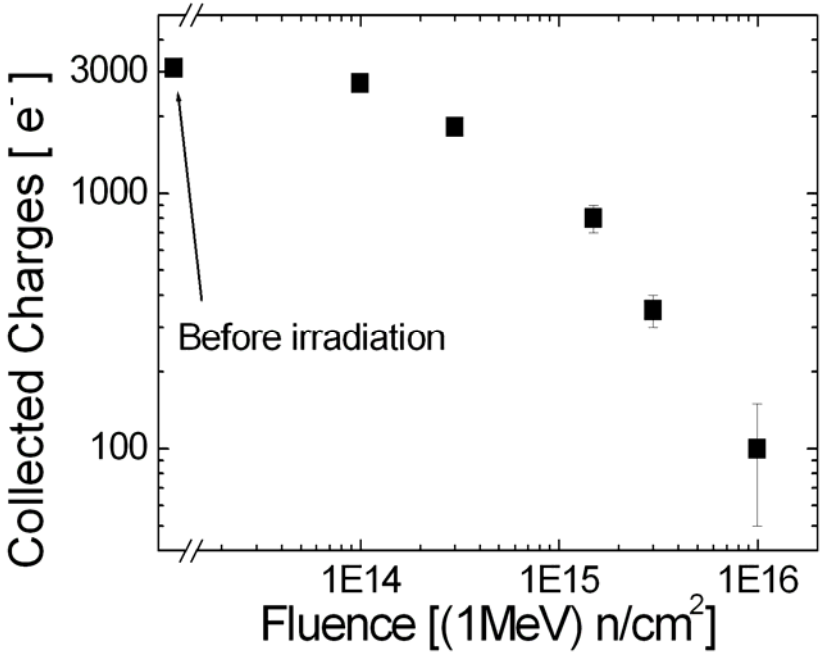
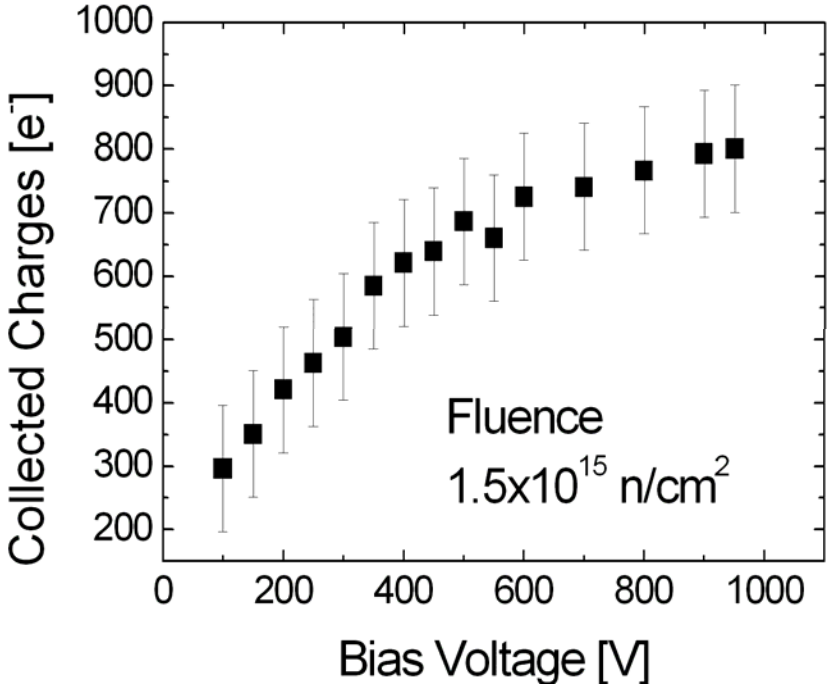


Figure 17: (a)Pulse height distributions before (blue curve) and after (red curve) the irradiation to 18×10^{15} p/cm^2. (b)Summary of proton irradiation results for pCVD material up to a fluence of 20×10^{15} p/cm^2 (filled data points). The blue curve is an exponential with exponent -0.08×fluence. Also shown are the results of the irradiation of the first scCVD diamond (open data points).

SiC (Data from Moscatelli et al. Rd50 7° Workshop Nov. 2005)

Epi-SiC: CCE 26% (800 e^{-}) after 1.5x10^{15} n/cm^2 with epilayer of 50μm.



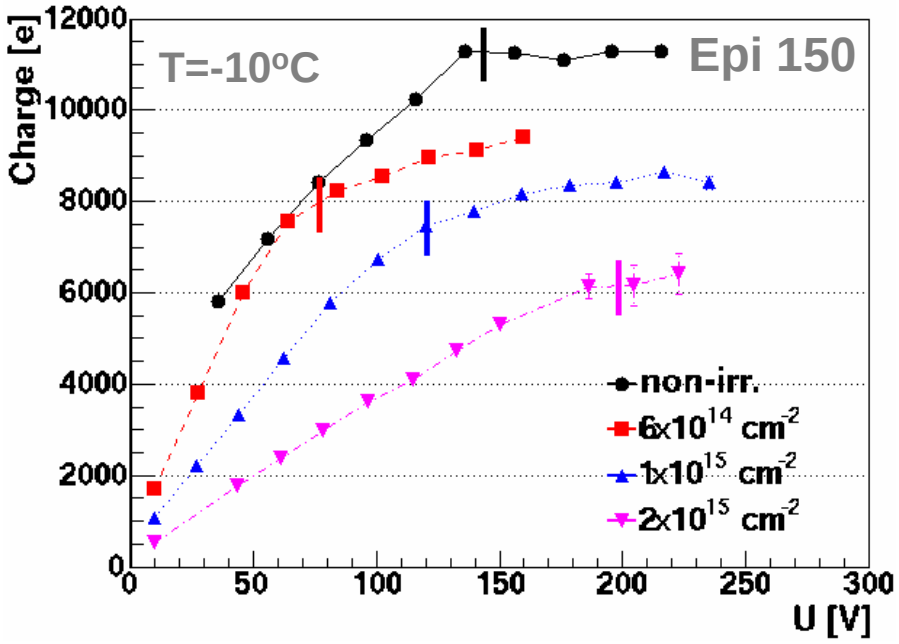


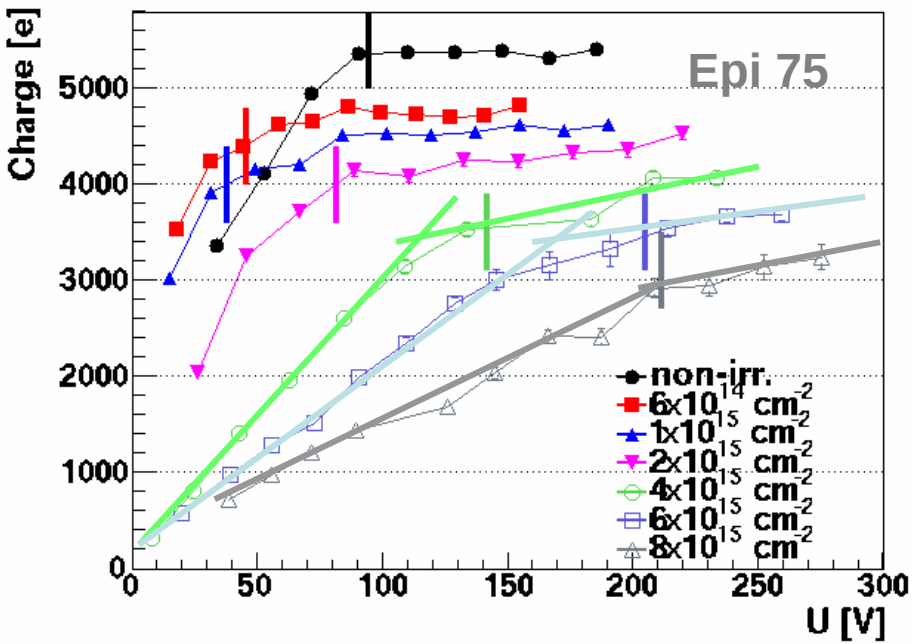
And from RESMDD05: 300 e^{-} at 600 V after 7x10^{15} n/cm^2

S. Sciortino et al. "Effects of heavy proton and neutron irradiations on epitaxial SiC Schottky diodes", NIM A 552 (2005) 138-145.

Epitaxial Silicon Thick epilayers (75-150μm)

M.I.P. measurements V_{fd} from CV is denoted by short line for every sensor!





75 μm diodes perform superbly in term of noise (no break downs) also at very high fluences!

- **kink in charge collection plot coincides with full depletion voltage from CV measurements! Also for heavily irradiated silicon detectors the full depletion voltage has meaning**
- **the signal for heavily irradiated sensors rises significantly after V_{fd} (trapping)**
- **>3200 e for 8x10^{15} cm^{-2} neutron irradiated sensor! – more than expected**