The MAD

BiCMOS FRONTEND ASIC
FOR THE READOUT
OF THE DRIFT TUBES OF
CMS BARREL MUON DETECTOR

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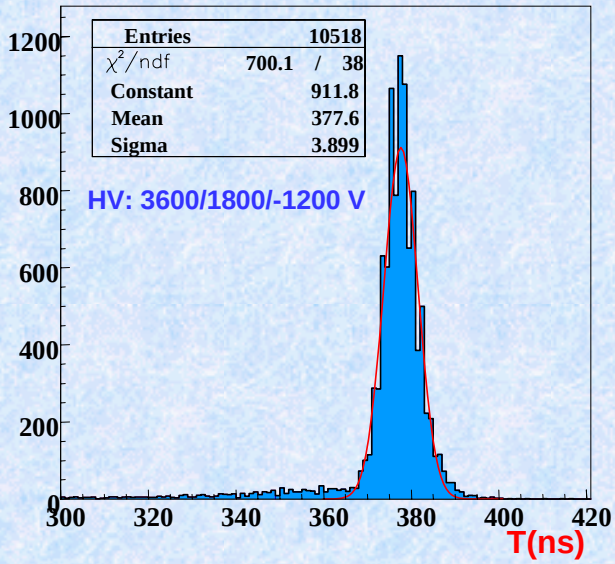
MAD on Beam

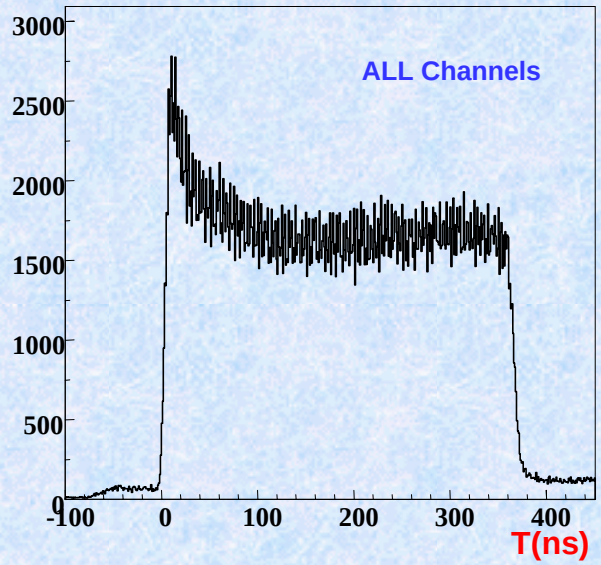
Q4 preliminary results - July '99 test beam

- Q4 prototype with final DT cell design
- chamber full equipped with MAD4 ASICs
- H2 muons test beam at CERN-SpS

Meantimer

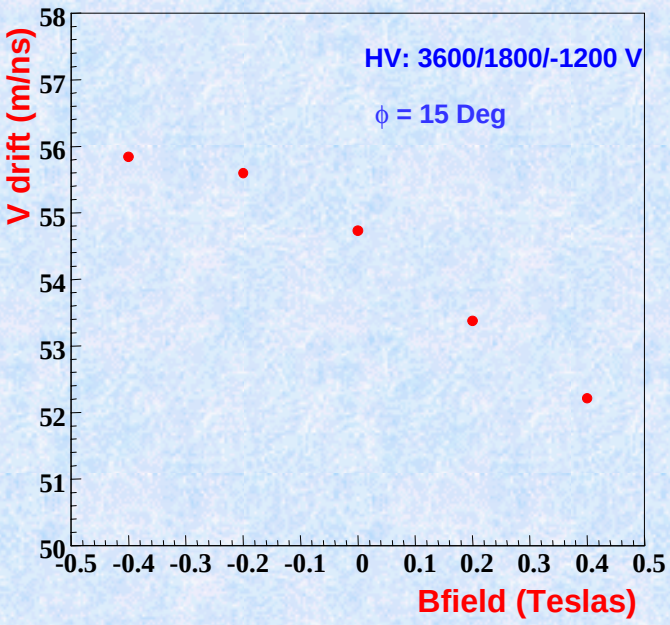


TDC Spectrum

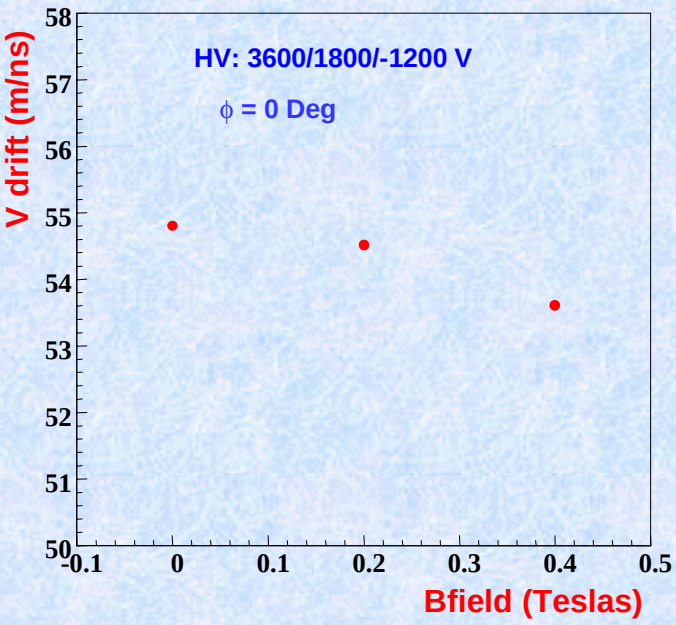


Preliminary results - raw data plots

Drift velocity vs Bfield

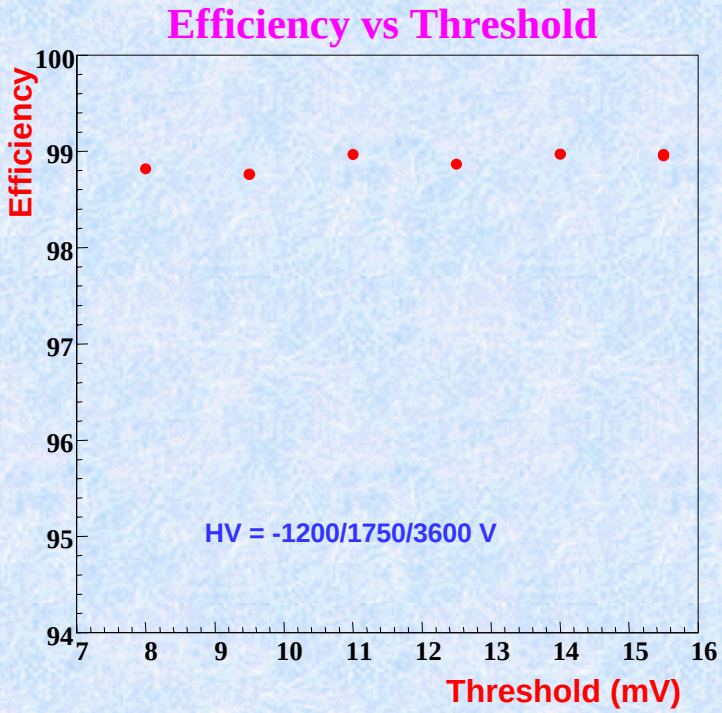


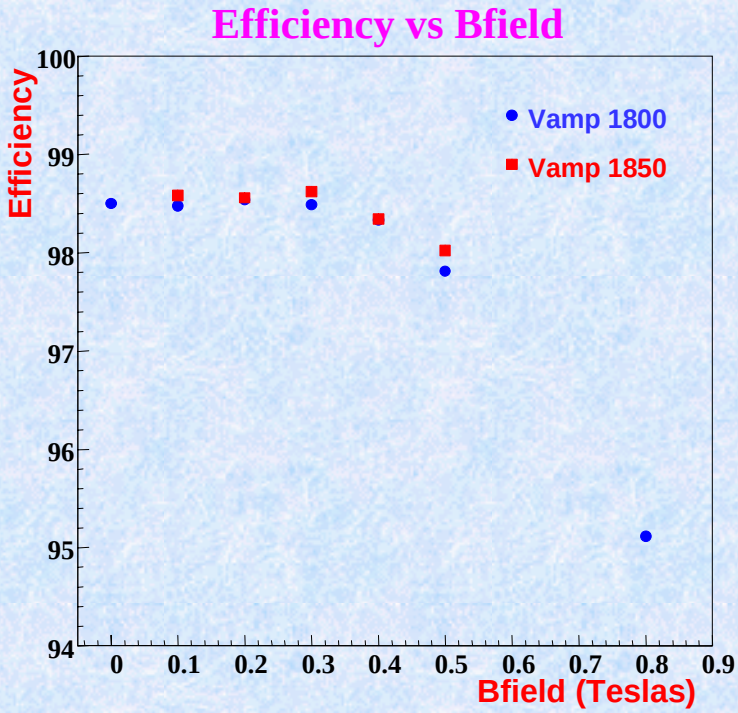
Drift velocity vs Bfield



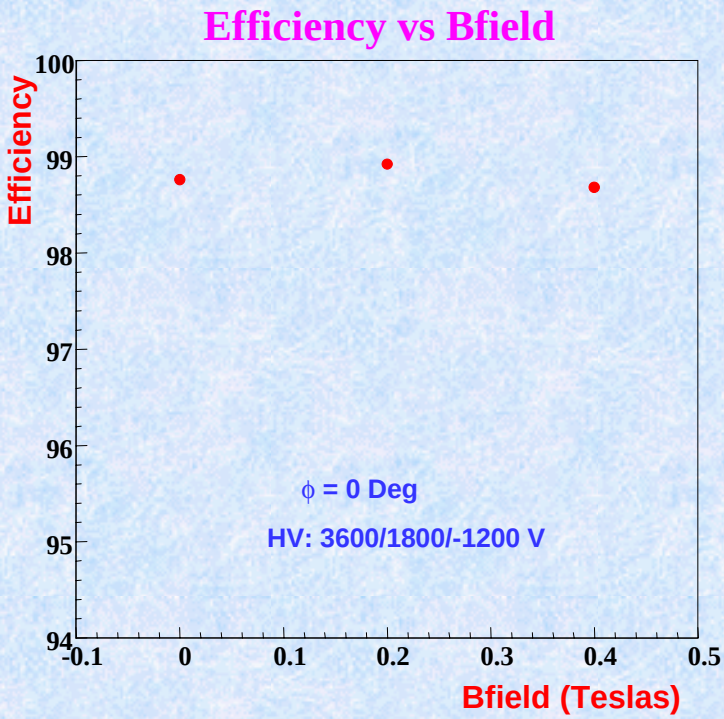
MAD on Beam

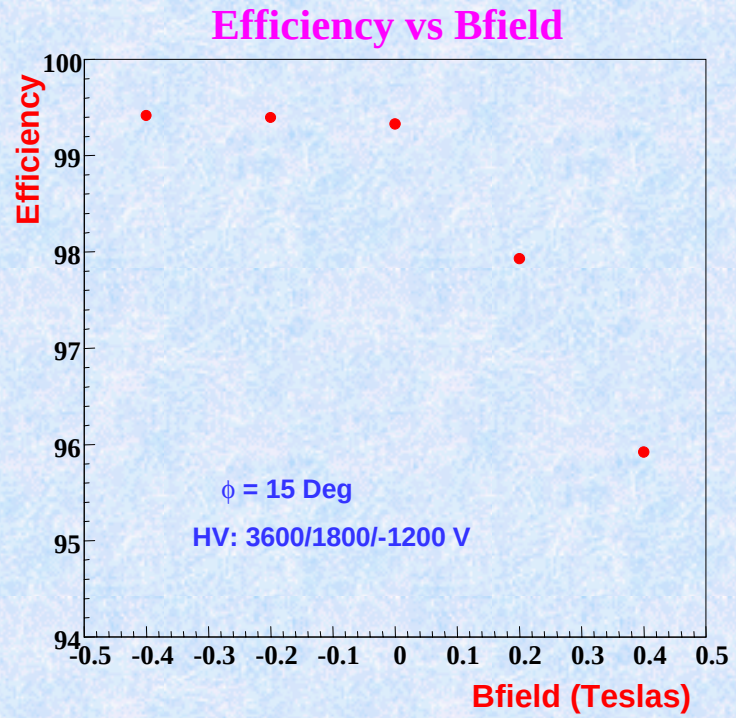
Efficiency vs Threshold and Bfield





Preliminary results - raw data plots

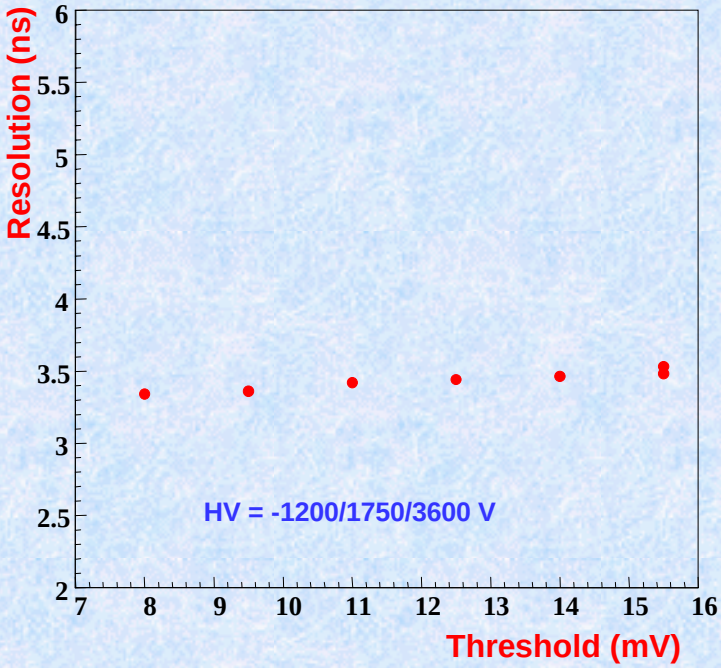




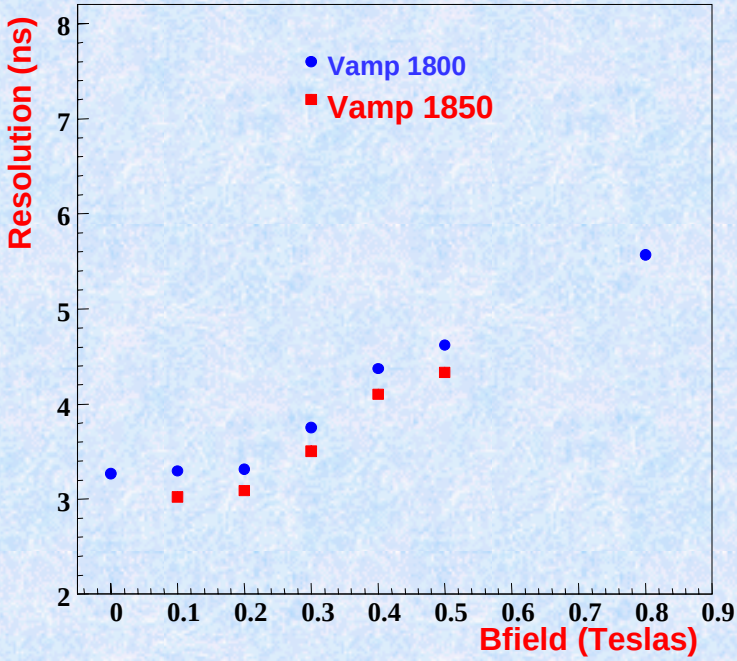
MAD on Beam

Resolution vs Threshold and Bfield

Resolution vs Threshold

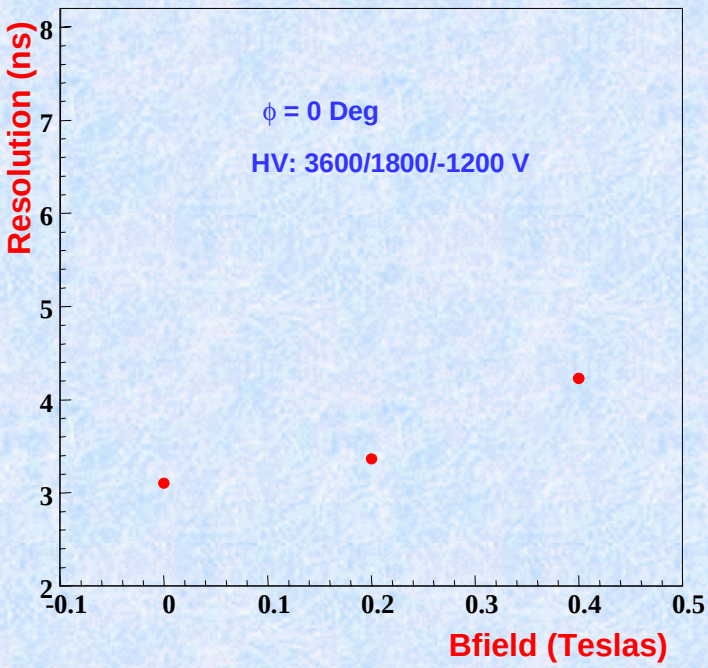


Resolution vs Bfield

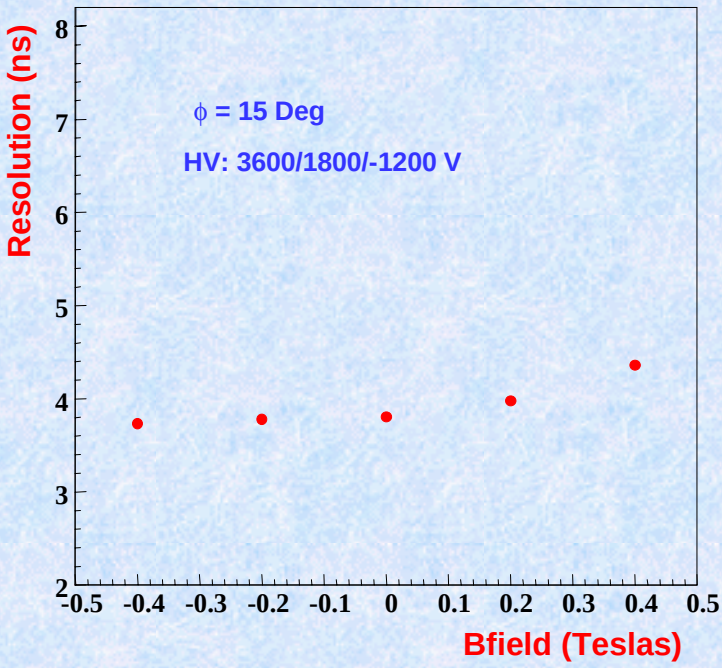


Preliminary results - raw data plots

Resolution vs Bfield



Resolution vs Bfield



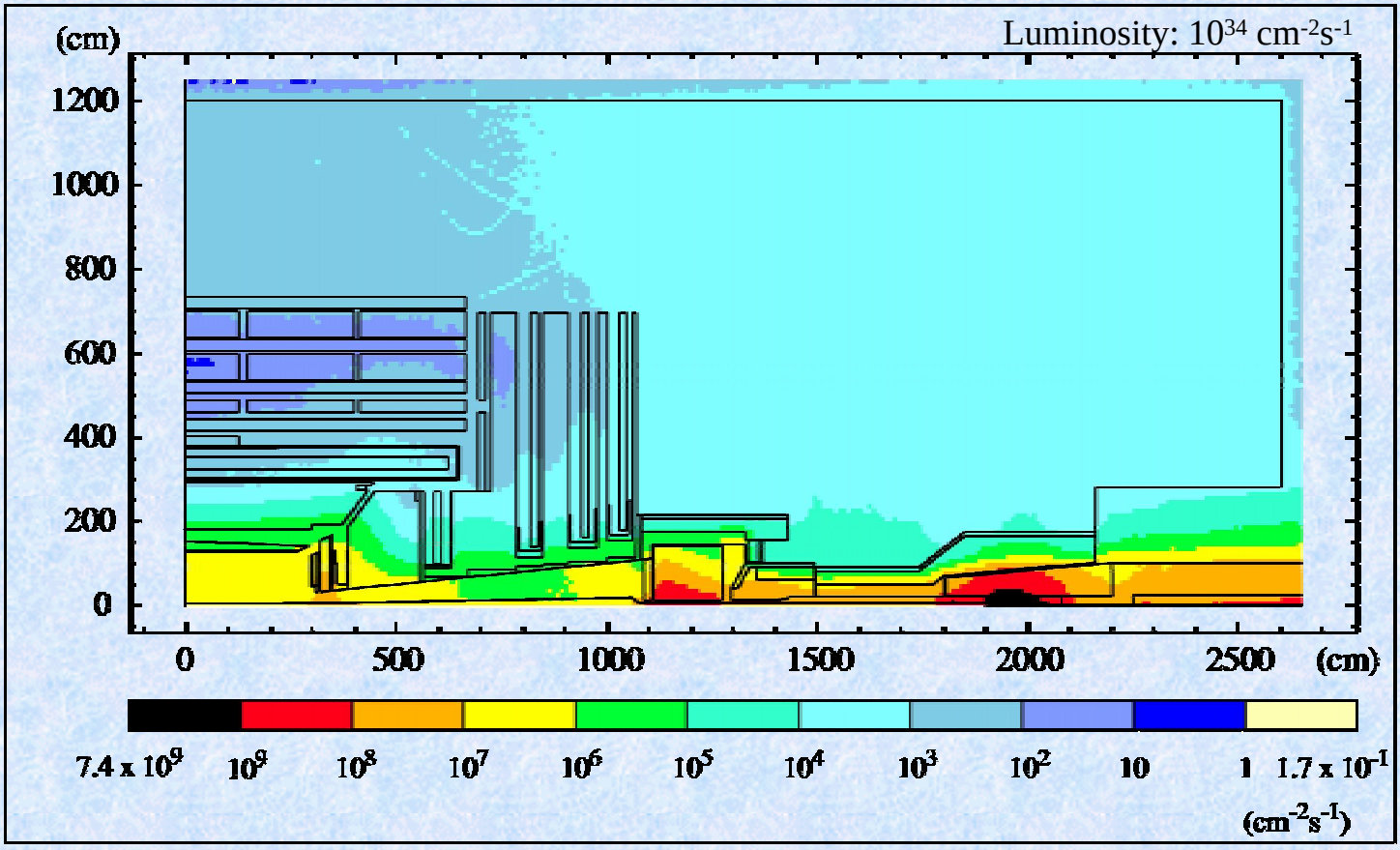
RADIATION TESTS

Gamma and Neutrons Irradiation

neutrons

In CMS barrel irradiation flux is very low,
only neutron flux can give problems by
Single Event Effects:

5 10^{10} n/cm^2 for 10y activity (10% thermal)



gamma

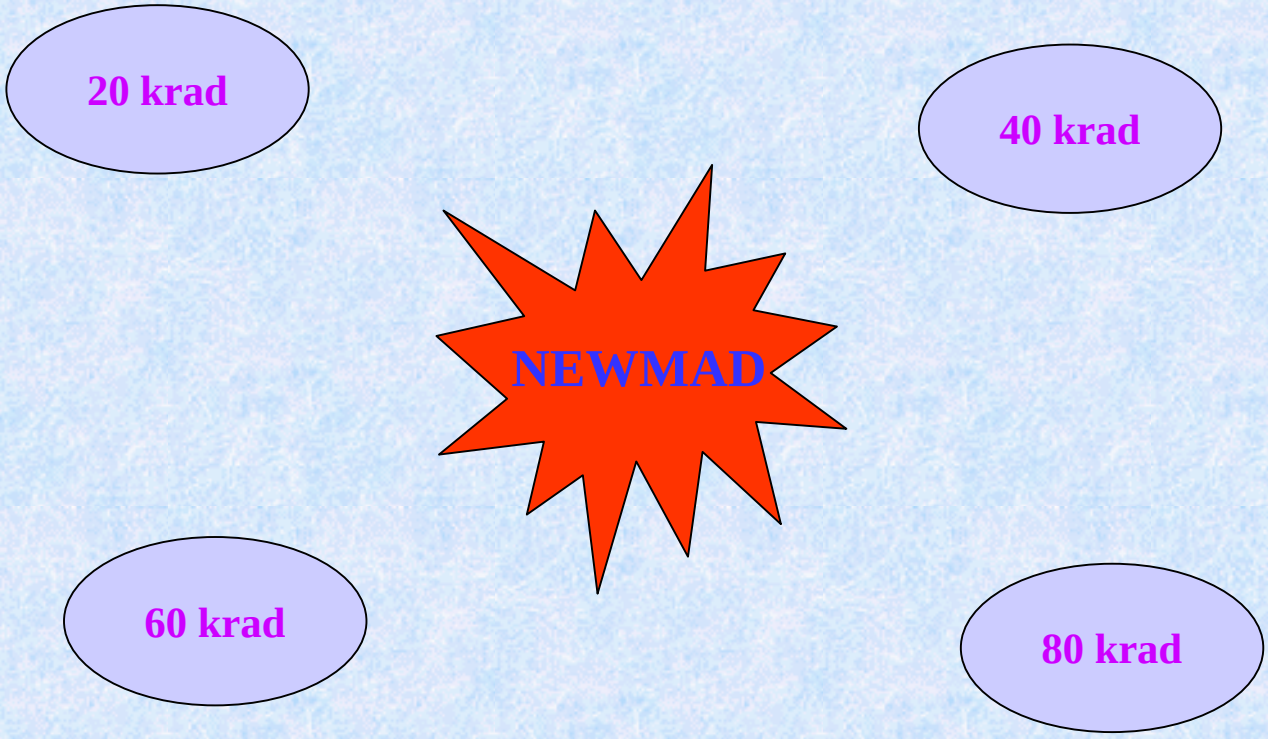
For best ASIC characterisation
gamma irradiation is tested too
(in CMS barrel the expected flux is below 10krad)

RADIATION TESTS

Gamma rays Irradiation

^{60}Co source

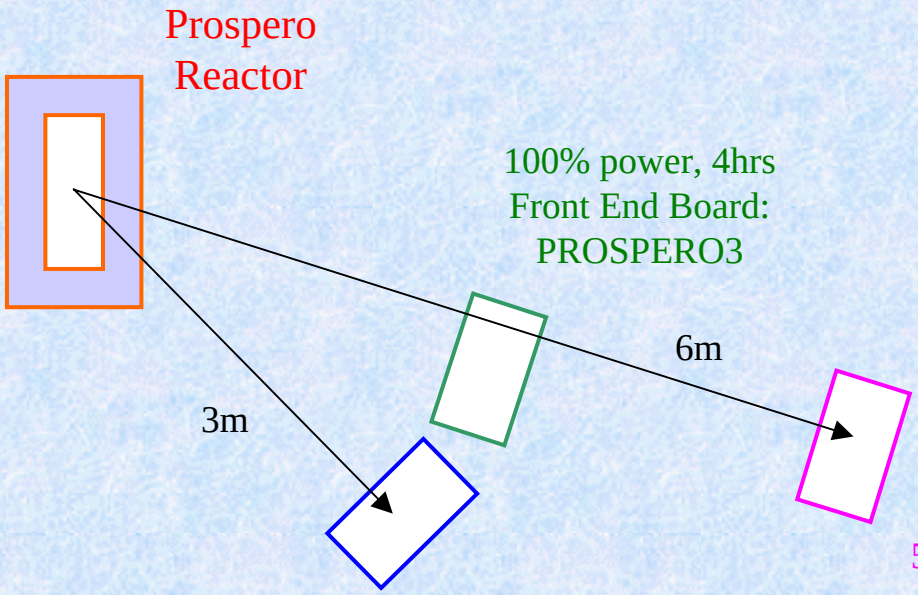
4 NEWMAD prototypes exposed to gamma rays at Bologna



NO dynamic or static changes measured!

RADIATION TESTS

Fast Neutrons at PROSPERO Facility

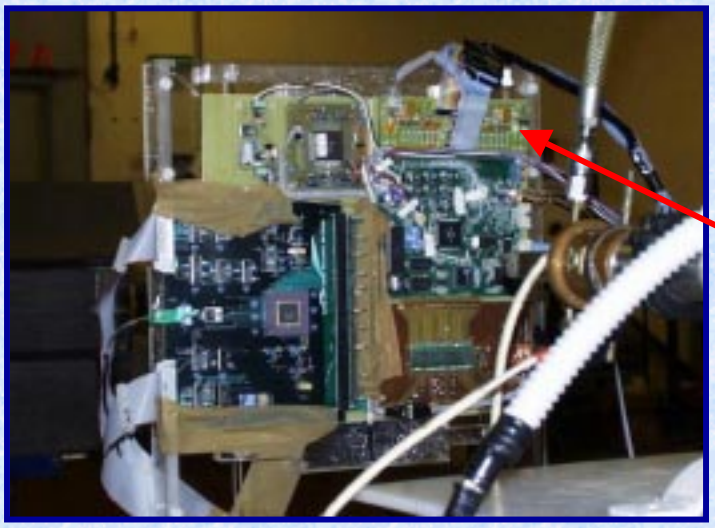


FRONT END BOARD	REACTOR DISTANCE	n/cm^2 EQ. 1MeV(SI)
PROSPERO1	6m	**4.85 10^{10}**
PROSPERO2	3m	**1.53 10^{11}**
PROSPERO3	3m	**1.72 10^{12}**

NO dynamic or static changes measured!

RADIATION TESTS

SE induced by Fast and Slow Neutrons at LNL



TRIMAD
PCF8577

CN Van de Graaff: 7 MeV Deuterium beam

Thermal Neutrons

⇨ Graphite moderator — $9.1\ 10^{9}$ n/cm^2

Fast Neutrons (up to 10 MeV)

⇨ $^{9}Be(d,n)^{10}B$ reaction — $4.0/6.3\ 10^{10}$ n/cm^2

NO changes measured on MAD and I^{2}C ICs!

RADIATION TESTS

SE induced by Fast and Slow Neutrons at LNL