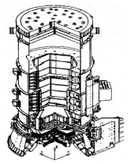
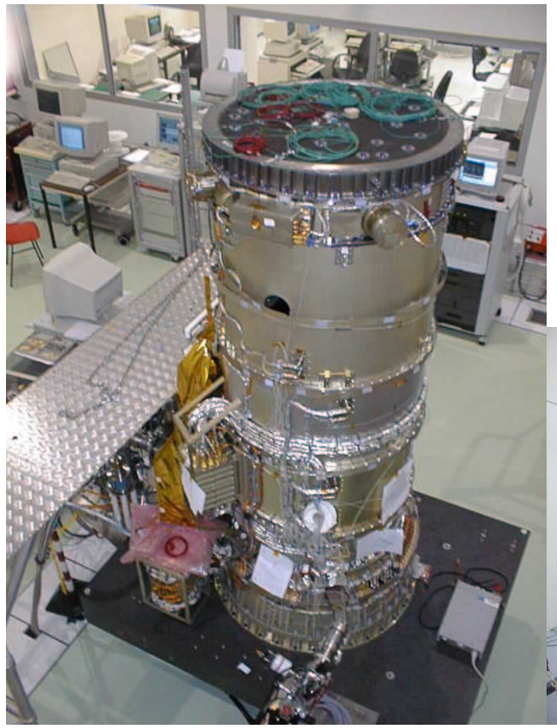
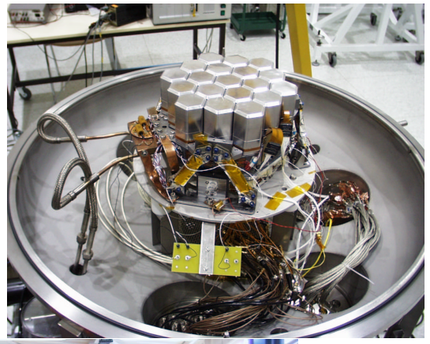
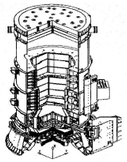


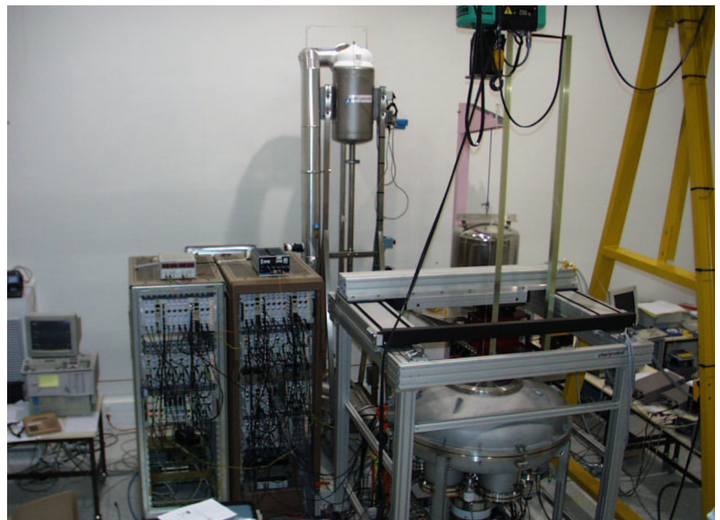
COMPARISON :
CAMERA FM CALIBRATION (SABATIER)
SPI FM CALIBRATION AT CNES (BIS)
SPI FM CALIBRATION AT BRUYERES LE CHATEL (SHORT DISTANCE SOURCES)

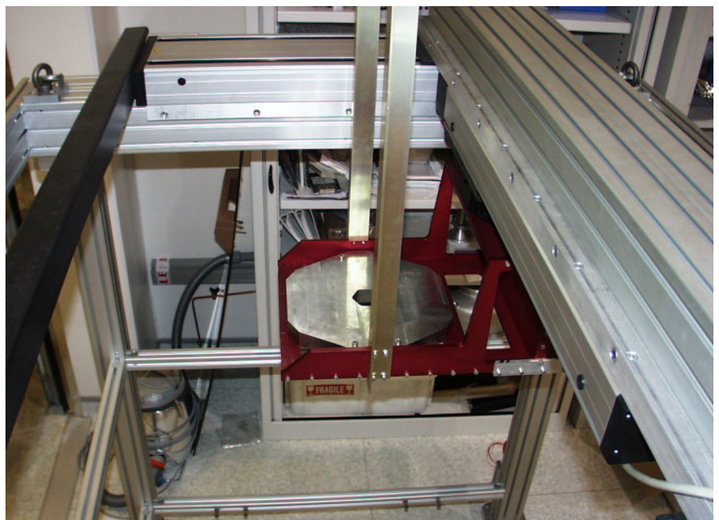


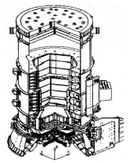




CAMERA FM CALIBRATION SYSTEM





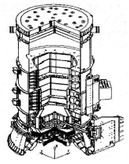


CALIBRATION SPI FM (BIS,CNES)

EXPERIMENTAL SETUP

We used 9 radioactive sources :

^{22}Na, ^{137}Cs, ^{57}Co, ^{85}Sr, ^{241}Am, ^{203}Hg, ^{109}Cd, ^{54}Mn, ^{228}Th



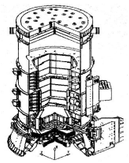
SPI FM, BRUYERES LE CHATEL

CALIBRATION WITHOUT CODED MASK

8 m sources

The following sources had been used :

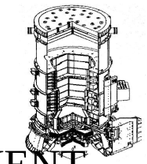
^{242}AM / ^{133}Ba / ^{137}Cs / ^{22}Na / ^{60}Co / ^{57}Co / ^{203}Hg / ^{85}Sr / ^{54}Mn
^{65}Zn / ^{88}Y / ^{139}Ce

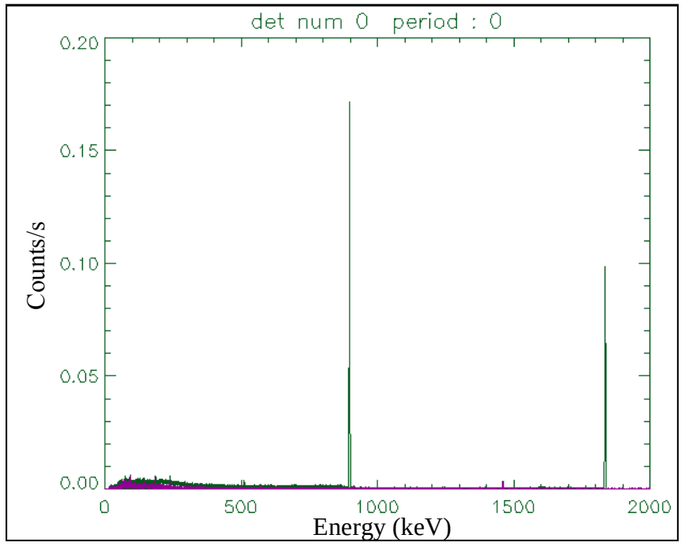


BRUYERES LE CHATEL SOURCES (SHORT DISTANCE) SETUP

Source Number	Energy	Source name	T1/2	ErrT1/2	A0	ErrA0	DateSources
70842	59,54	Am241	158040	183	3511	3	01/04/01
763162	122,063	Co57	271.77	0.1	7821	3	15/04/01
763167	513,99	Sr85	64.73	0.2	12807	1.5	15/04/01
733742	661,646	Cs137	11012	22	6967	3	01/04/01
763151	834,81	Mn 54	312.15	0.08	7032	3	15/04/01
763164	898,042	Y88	106.62	0.025	7592	3	15/04/01
763164	1836,064	Y88	106.62	0.025	7592	3	15/04/01

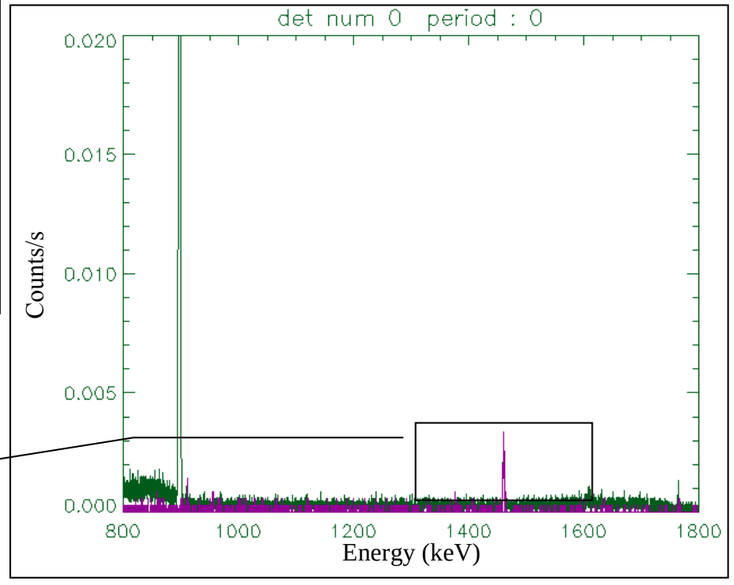
Source Number	Energy	Source name	Air absorption coefficient	Source Distance	Single Evt dead time / det (%)
70842	59,54	Am241	0.00021641	8230.8	1,26
763162	122,063	Co57	0.00010396	8230.8	1,37
763167	513,99	Sr85	0.00010396	8230.8	1,67
733742	661,646	Cs137	0.00009330	8230.8	1,49
763151	834,81	Mn 54	0.00008259	8230.8	1,56
763164	898,042	Y88	0.00008259	8230.8	1,99
763164	1836,064	Y88	0.00005359	8230.8	1,99

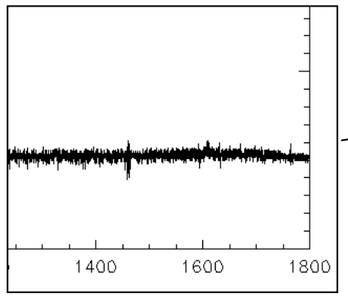




PROCESSING OF SINGLE EVENT EFFICENCIES :

Background reduction

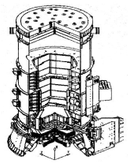


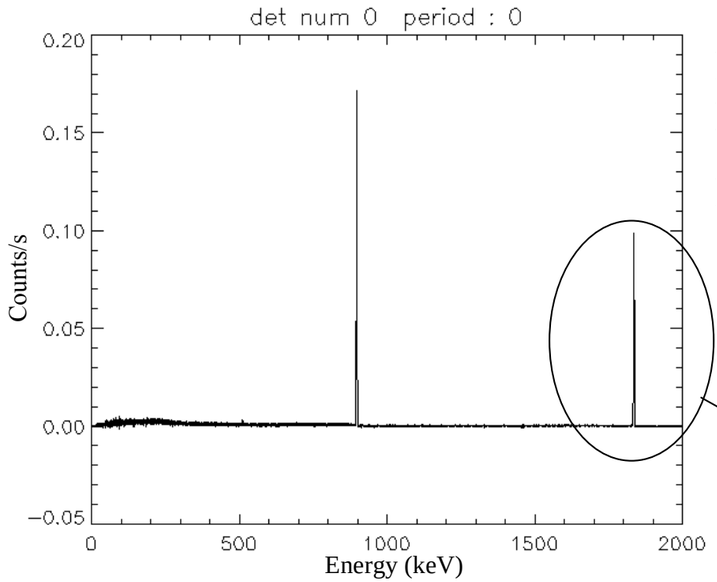


Reduced Spectra

Background adjustment

Y88 Source (BRUYERES LE CHATEL)





Spectra with background reduction

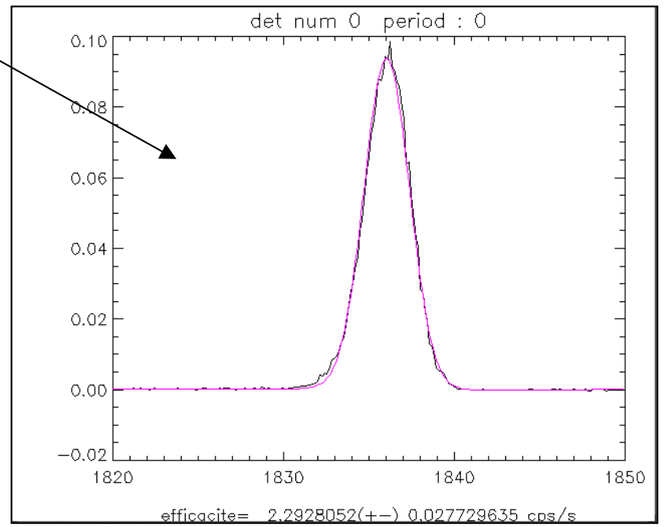
FIT TYPE (Bouchet) : Step function

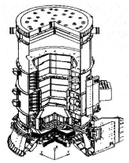
Gaussian curve

PROCESSING OF SINGLE EVENT EFFICENCIES :

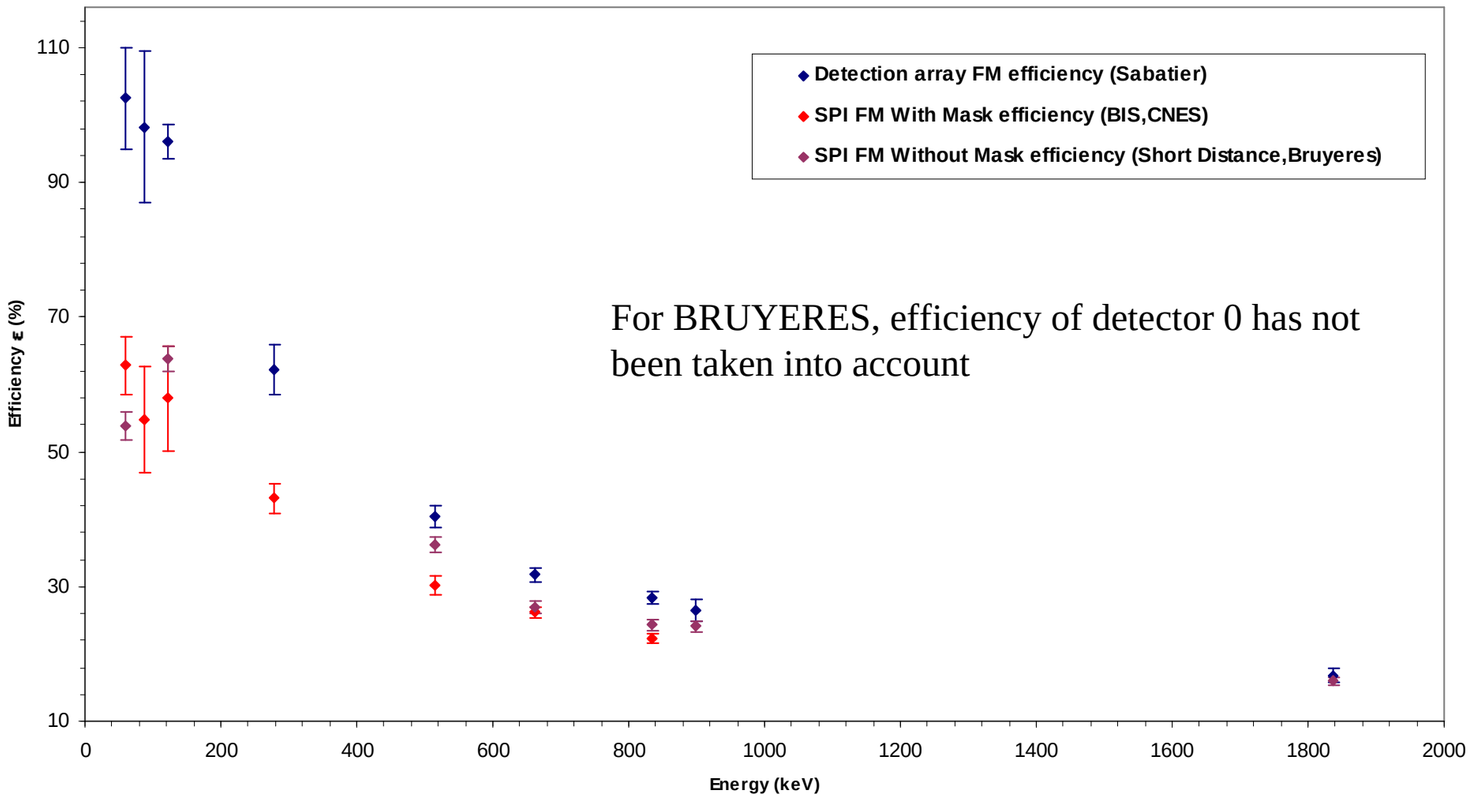
FULL ENERGY PEAK FITTING

Y88 Source (BRUYERES LE CHATEL)

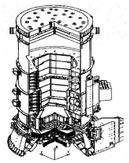




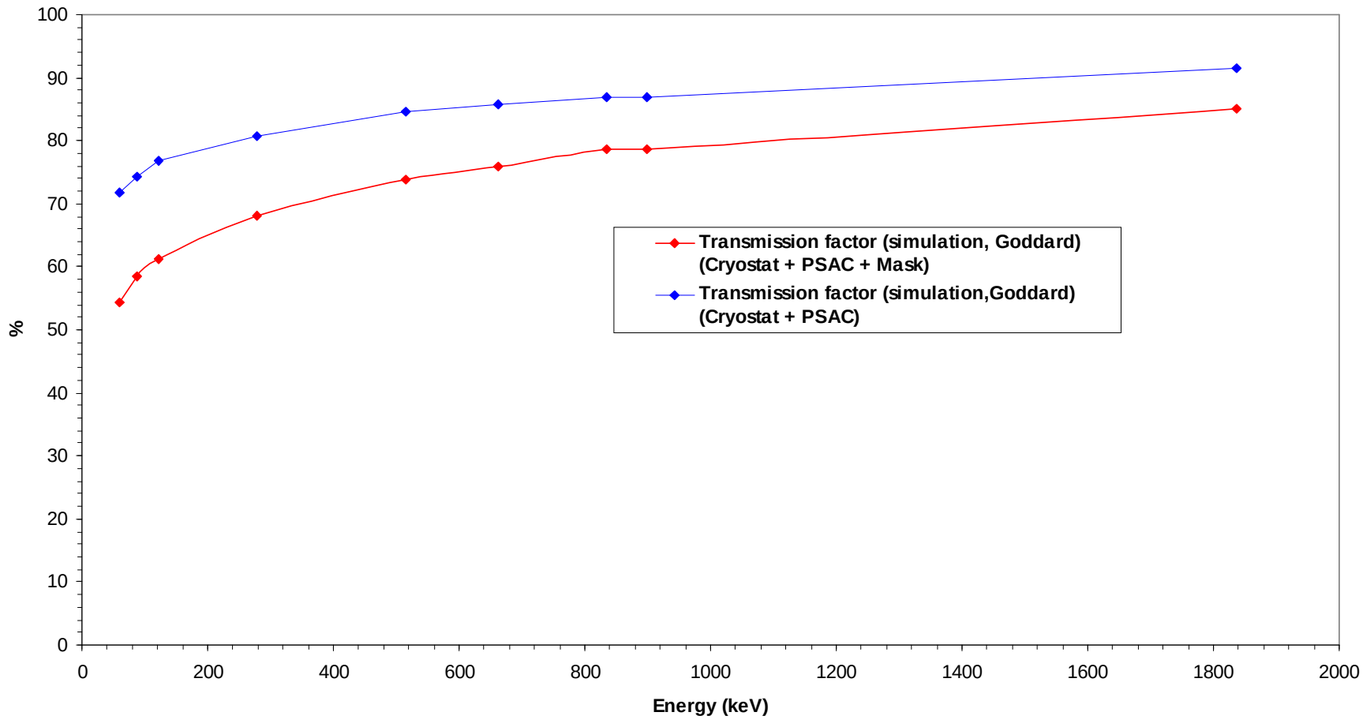
SPI FM : AVERAGE EFFICIENCY (Measurement)
SINGLE EVENTS (FULL ENERGY PEAK), BACKGROUND SUBSTRACTION

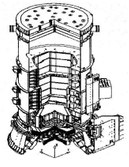


For BRUYERES, efficiency of detector 0 has not been taken into account



SPI TRANSMISSION FACTOR SiMULATION (Goddard)





TRANSMISSION FACTOR AND DETECTION ARRAY EFFICIENCY (SINGLE EVENTS) ESTIMATION METHOD

We have 3 types of Measure efficiencies :

- The efficiency of the detection array (ε_{array}).
- The efficiency of SPI with Mask, PSAC and Cryostat (ε_{SPI0}).
- The efficiency of SPI with PSAC and Cryostat (ε_{SPI1}).

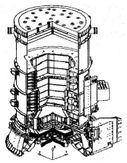
We have transmission factors (simulation,Goddard) for Mask, PSAC and Cryostat (η_{SPI0}) and for PSAC and Cryostat (η_{SPI1}).

We can estimate transmission factors using measurements:

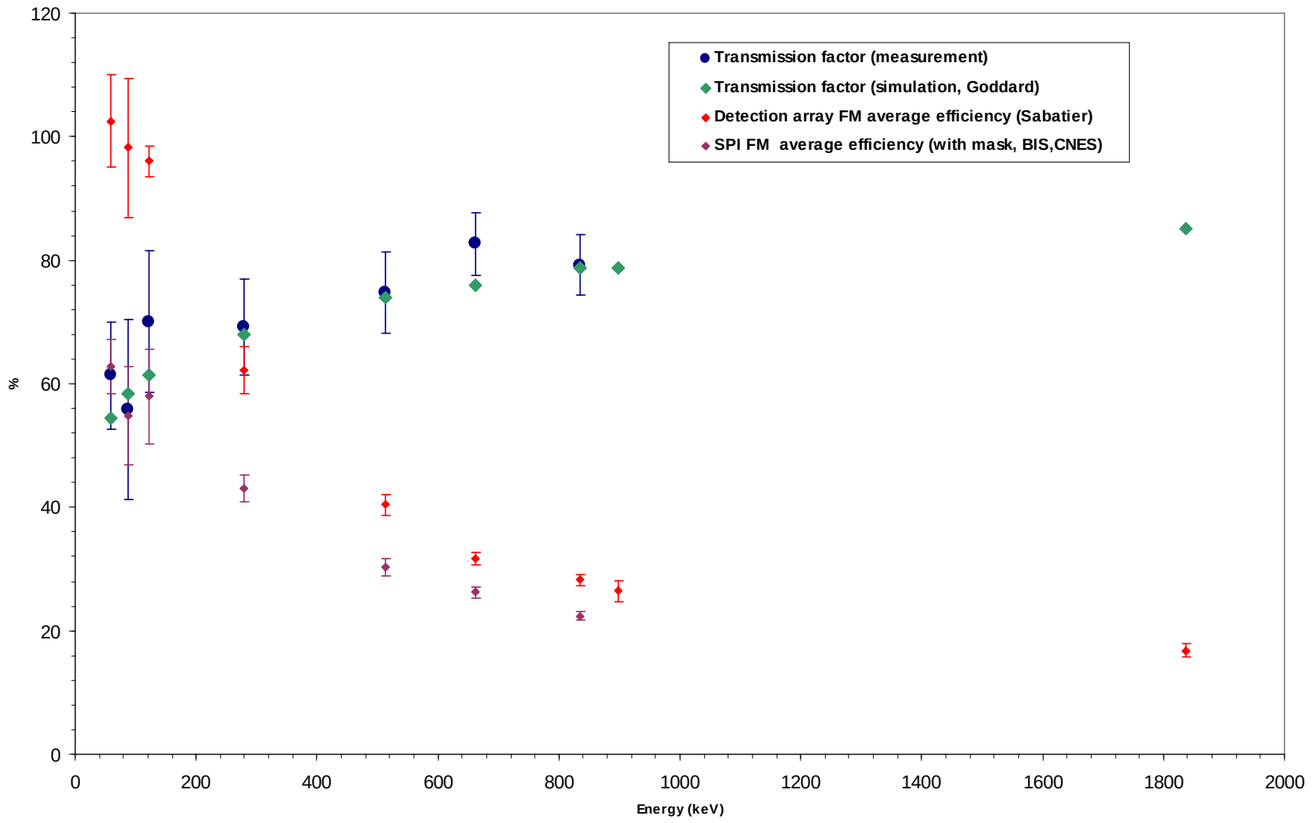
$$\eta_{SPI0} = \varepsilon_{SPI0} / \varepsilon_{array} \quad \text{and} \quad \eta_{SPI1} = \varepsilon_{SPI1} / \varepsilon_{array}$$

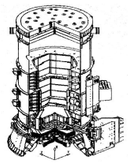
We can estimate detection array efficiency using SPI efficiencies and transmission factors.

$$\varepsilon_{array} = \varepsilon_{SPI0} / \eta_{SPI0} \quad \text{and} \quad \varepsilon_{array} = \varepsilon_{SPI1} / \eta_{SPI1}$$

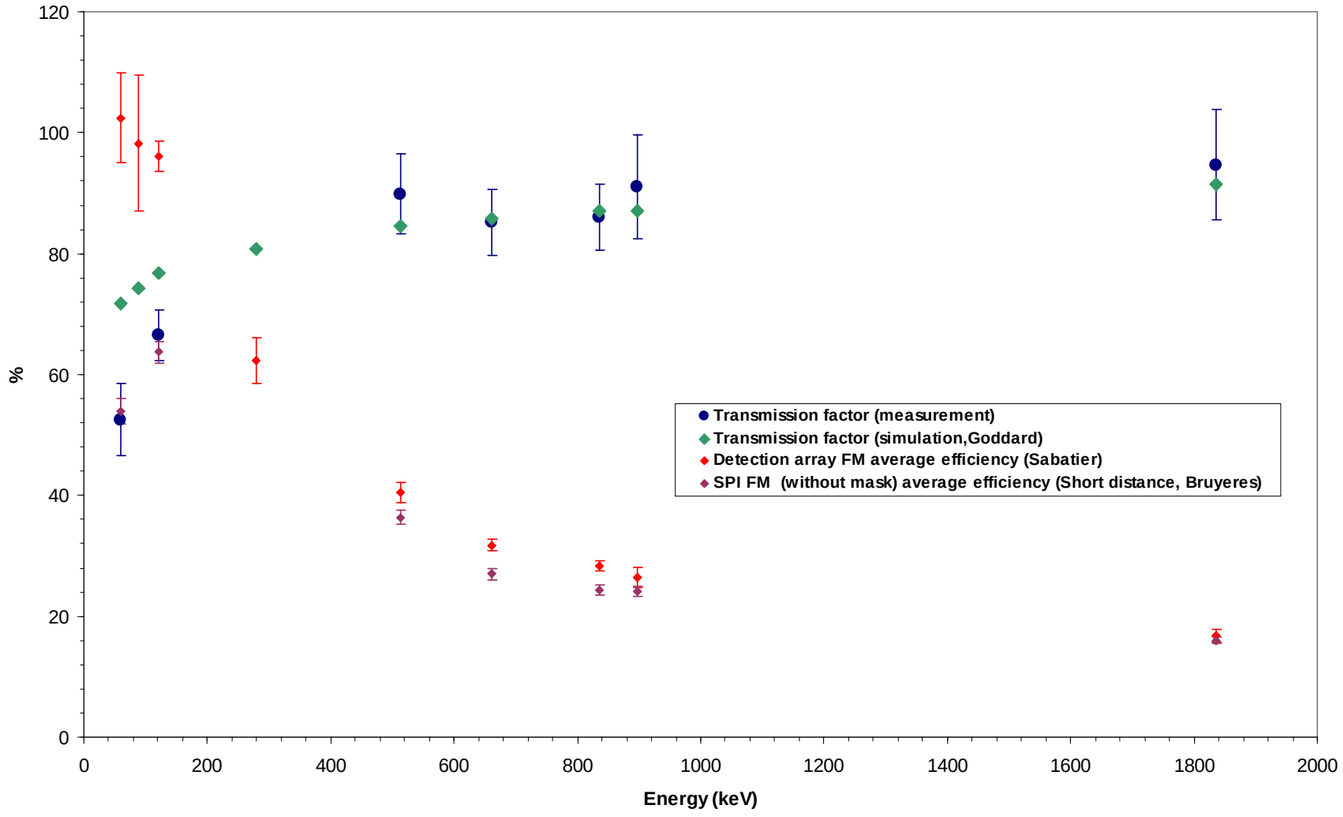


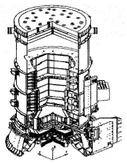
SPI TRANSMISSION FACTOR ESTIMATION (Cryostat + PSAC + Mask)
USING DETECTION ARRAY FM EFFICIENCY AND SPI FM EFFICIENCY (MEASUREMENTS AT CNES)



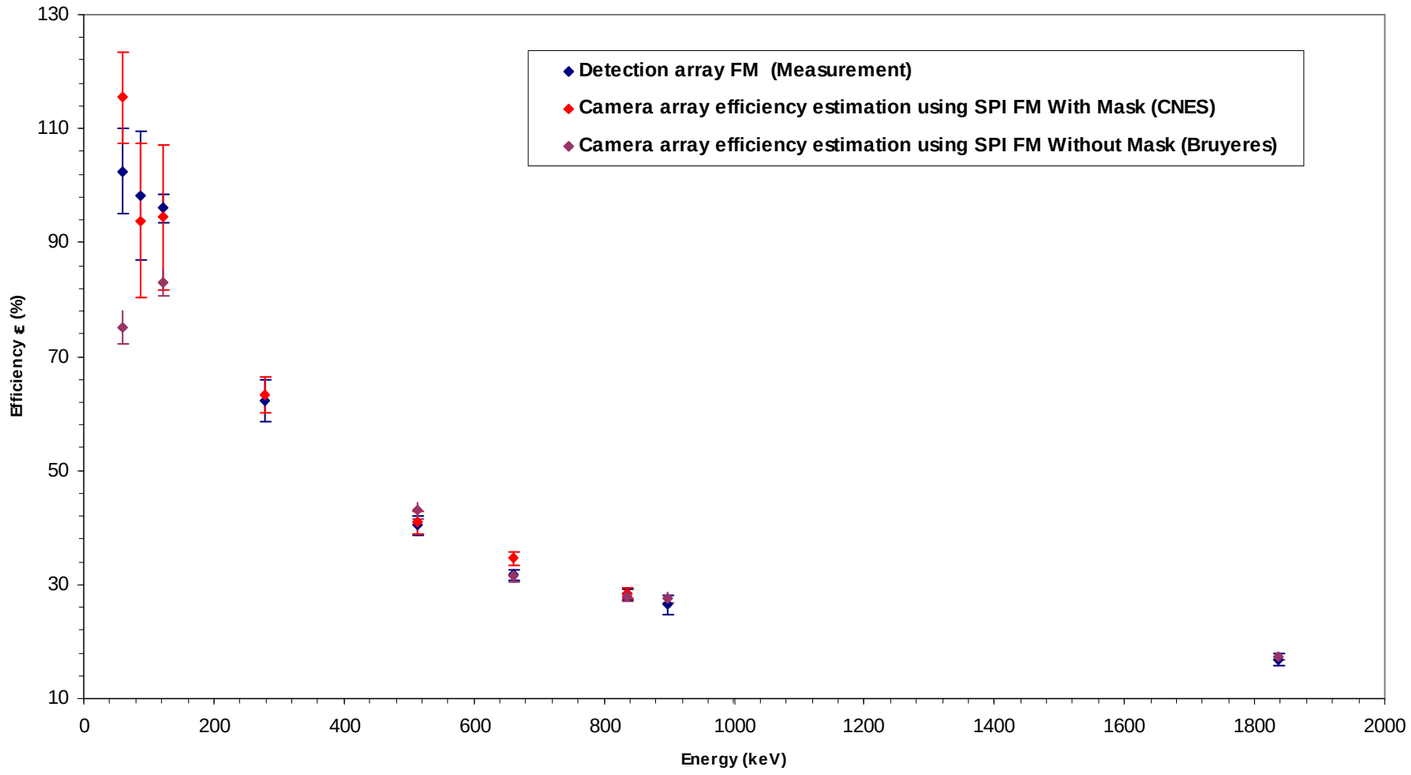


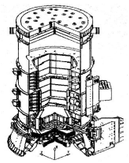
SPI TRANSMISSION FACTOR ESTIMATION (Cryostat + PSAC)
USING DETECTION ARRAY FM EFFICIENCY (MEASUREMENTS AT CNES)
AND
SPI FM EFFICIENCY (MEASUREMENTS AT BRUYERES LE CHATEL, Short Distance Sources)



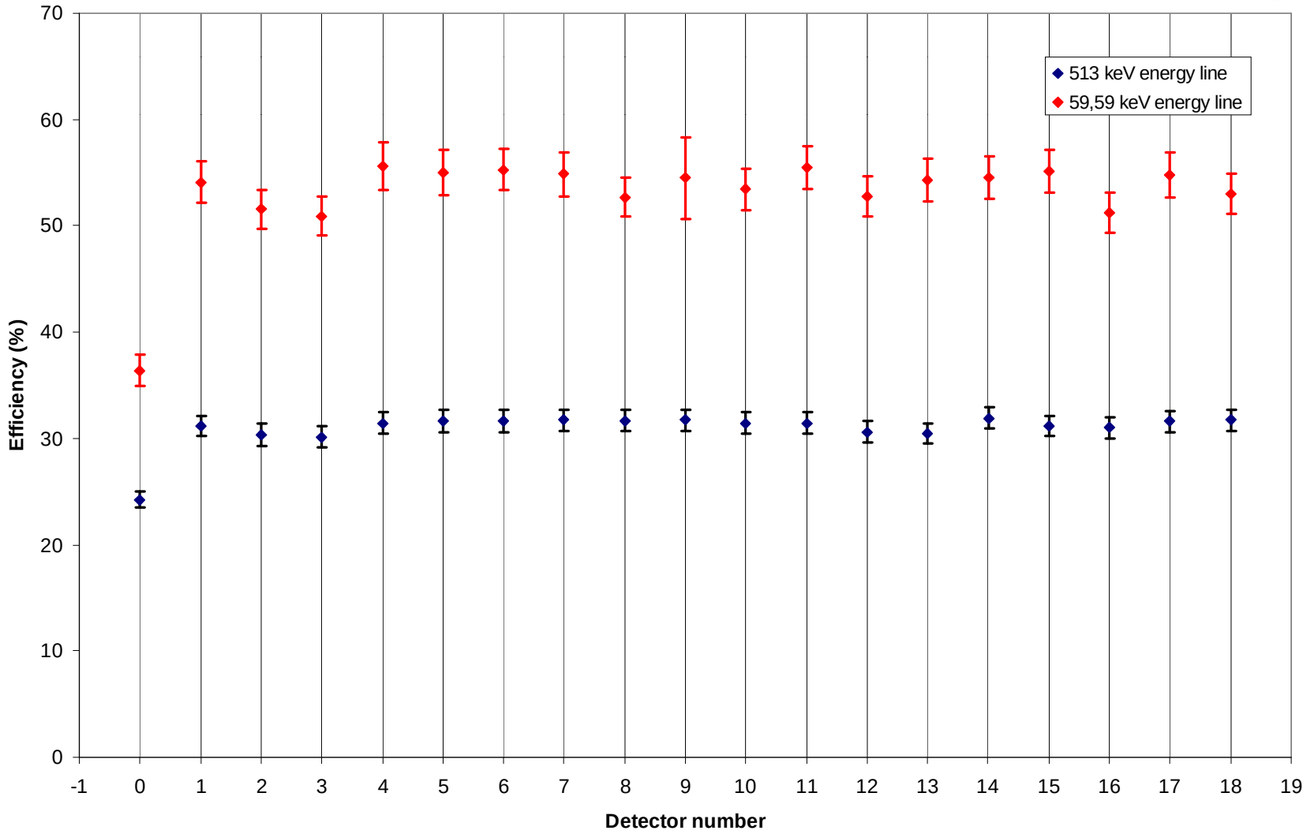


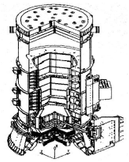
SPI FM AVERAGE EFFICIENCY ESTIMATION DETECTION PLAN FOR SINGLE EVENTS (FULL ENERGY PEAK)





STABILITY OF SPI FM SINGLE EVENT EFFICIENCIES
(CALIBRATION OF SHORT DISTANCE SOURCES AT BRUYERES LE CHATEL)





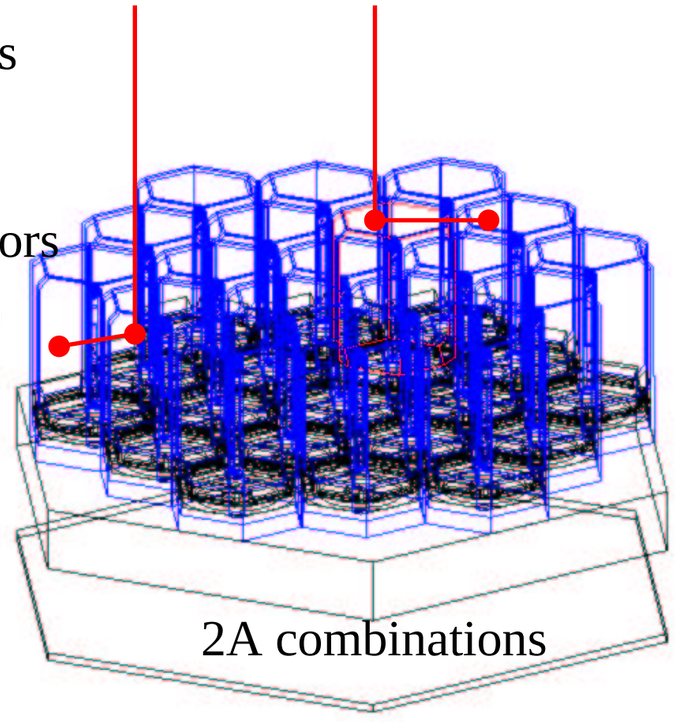
DOUBLE EVENT DETECTORS

Two types of double events were taken into account :

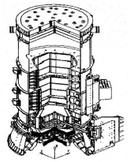
- All double event combinations

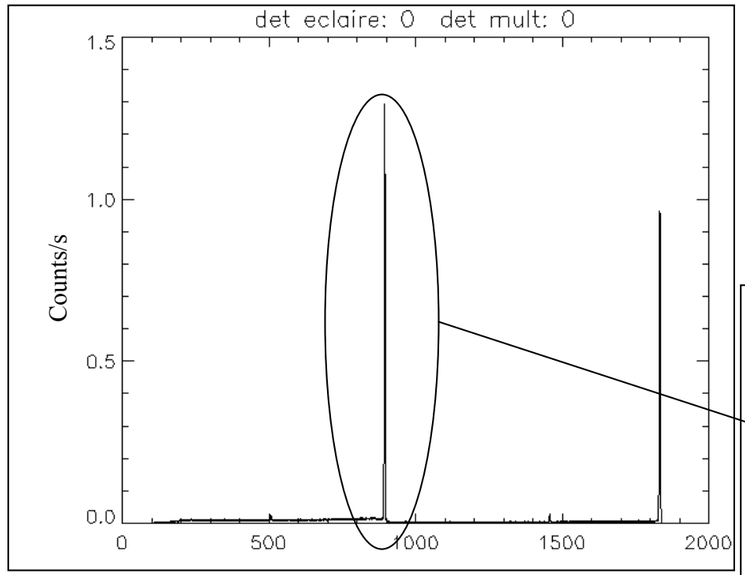
- 2A combinations :

(only when two adjacent detectors are involved in the interaction)



2A combinations



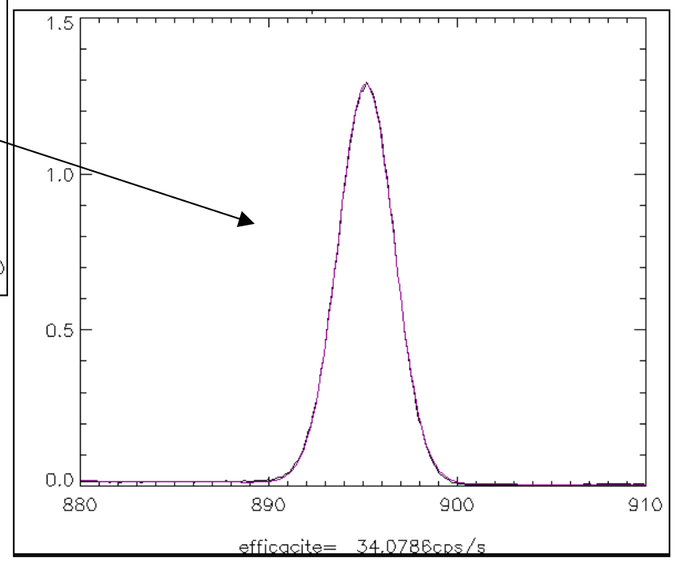


Sum of double event (2A) Spectra.

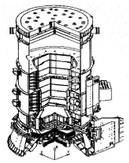
source : Y88 (BRUYERES LE CHATEL)

DOUBLE EVENT PROCESSING :

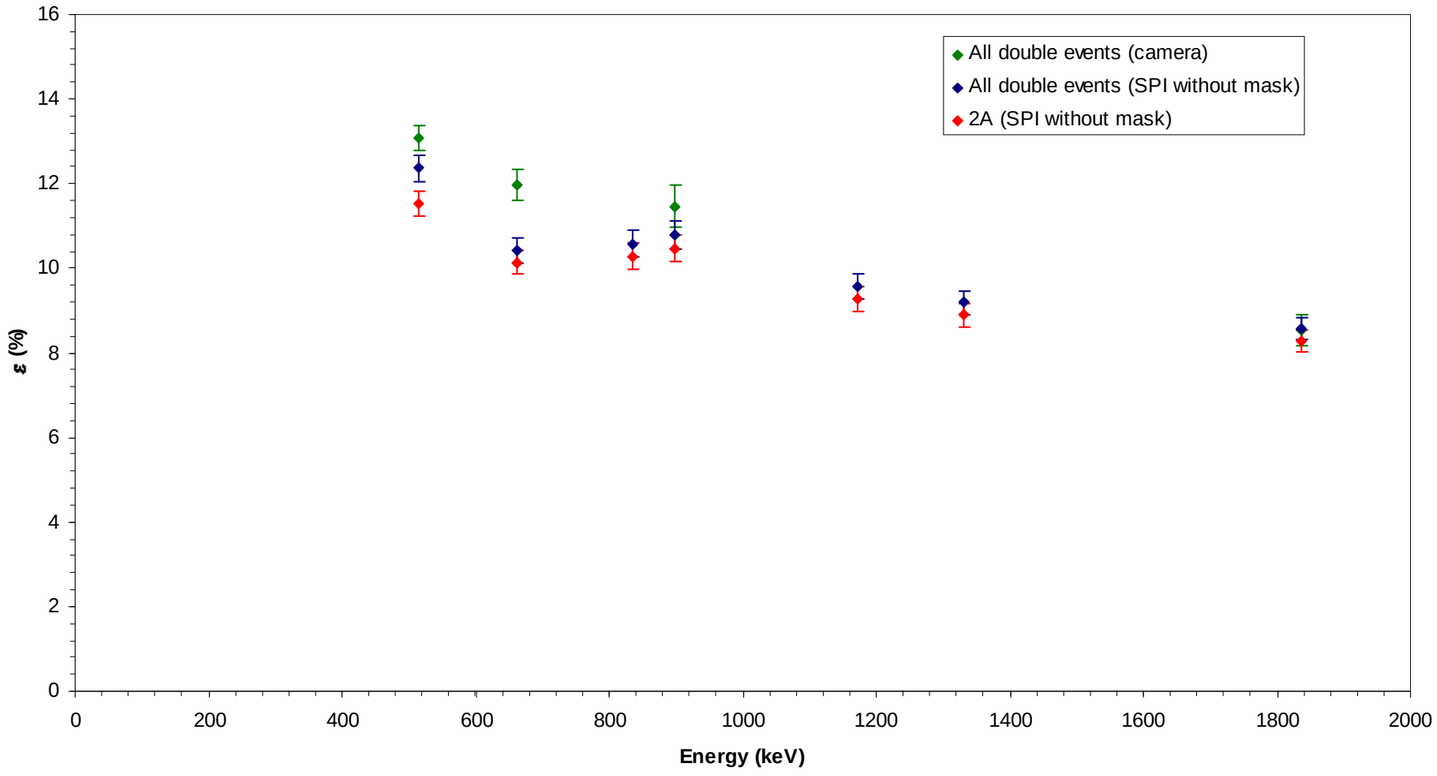
Sum of all double event combinations.

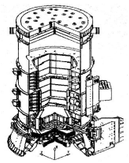


1836 keV energy line fit

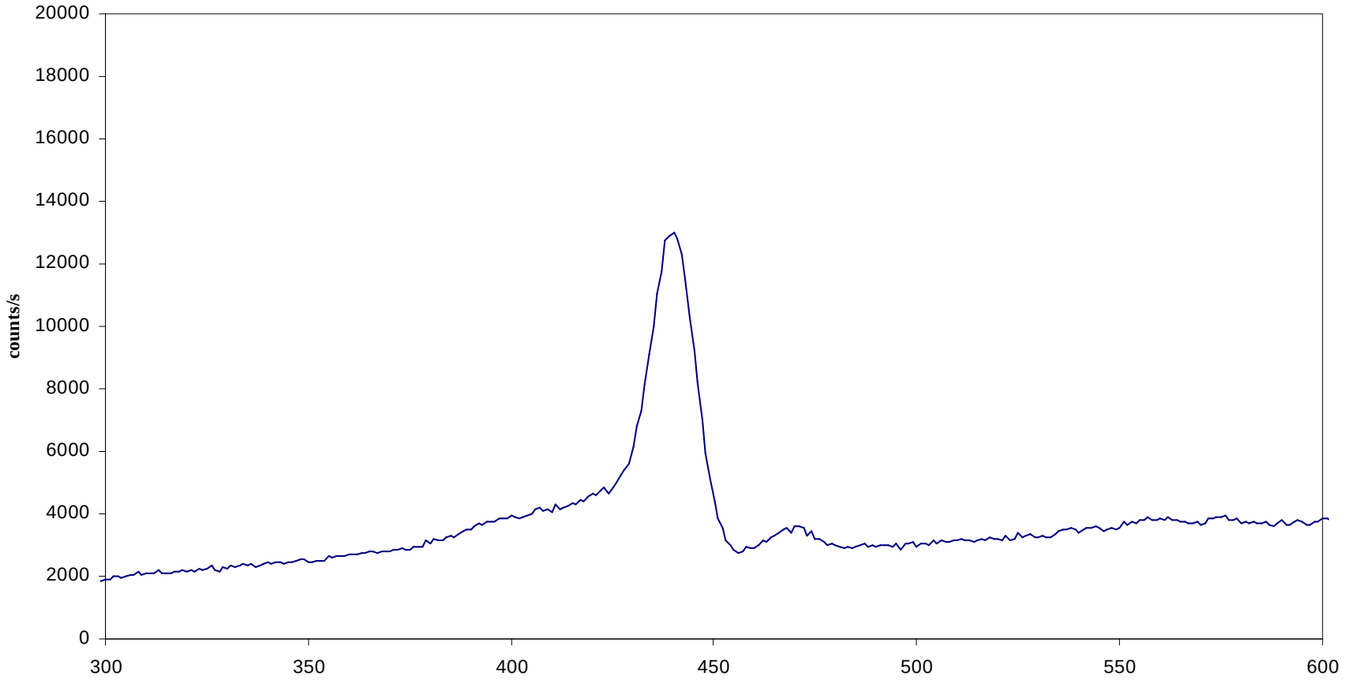


DOUBLE EVENT EFFICIENCY (FULL ENERGY PEAK)





SIMPLE EVENTS SPECTRA



STATUS : Sequence 700021
Sources : Na 22, Mn 54, Am 241, Zn 65, Co 60, Co 57, Cd 109, Cs 137
Configuration : Test PI 12, Detector FM 25