

Preliminary results of SI3 and ICCH-CR-39 experiments obtained by PADC track etch detectors

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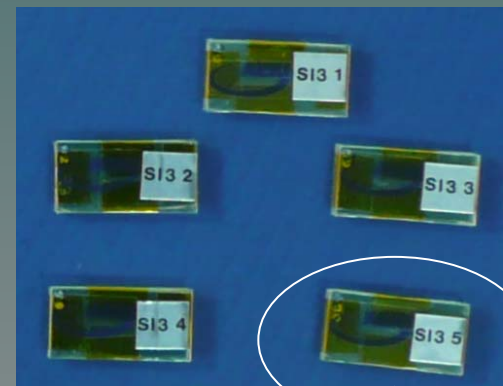
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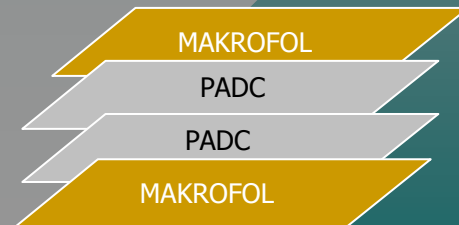
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8th-10th September 2009, DUBLIN**

INTRODUCTION - Position of the AERI detectors 1.(SI3)

Stack #I	Stack #II	Stack #III	Stack #IV	Stack #V	
NPI Top + Page No1	NIRS Top + SI3-T-001	ATI Top + SI3-T-005	OSU Top + SI3-OSU-4-1	IBMP SI3-T-015	Top ↑ ↓ Bottom
INP Top + SI3 IFJ 1	JAXA Top + JAXA-301	DLR Top + DLR I	NASA-JSC Top + SI3-JSC-4-1	Armenia SI3-T-016	
SCK-CEN Top + SI3-T-008	SI3 BL 2	SI3 BL 3	SI3 BL 4	SI3 BL 5	
SI3 BL 1	SI3-T-011	SI3-T-012	SI3-T-013	SI3-T-014	
SCK-CEN Bottom + SI3-T-009	SI3-B-001	SI3-B-002	SI3-B-003	SI3-B-004	
INP Bottom + SI3 IFJ 2	SI3 1	SI3 2	SI3 3	SI3 4	
NPI Bottom + Page No2	TD-1 No1	TD-1 No2	TD-1 No4	TD-1 No3	
	Page No4	Page No5	DLR IV	DLR V	
	JAXA Bottom + JAXA-302	DLR Bottom + DLR II	NASA-JSC Bottom + SI3-JSC-4-2	Armenia SI3-T-017	
	NIRS Bottom + SI3-T-002	ATI Bottom + SI3-T-006	OSU Bottom + SI3-OSU-4-2	IBMP SI3-T-018	



- Travelling background detectors
- Thickness of stacks: 3 mm



Position of the AERI detectors 1.(SI3)- in Russian Service Module

Wall #1 SI 1	Wall #2 SI 2	Wall #3 SI 3	Wall #4 SI 4	Wall #5 SI 5	Wall #6 SI 6	
SI3-W-T-001	SI3-W-T-002	SI3-W-T-003	SI3-W-T-004	SI3-W-T-005	SI3-W-T-006	
SI3-W-B-001	SI3-W-B-002	SI3-W-B-003	SI3-W-B-004	SI3-W-B-005	SI3-W-B-006	
SI3-OSU-1-1	SI3-OSU-1-2	SI3-OSU-2-2	SI3-OSU-2-1	SI3-OSU-3-2	SI3-OSU-3-1	
SI3-JSC-1-1	SI3-JSC-1-2	SI3-JSC-2-2	SI3-JSC-2-1	SI3-JSC-3-1	SI3-JSC-3-2	
Box 2 1	Box 2 2	Box 2 3	Box 2 4	Box 2 5	Box 2 6	
Page No3 K46	Page No4 K47	Page No3 K51	Page No4 K52	Page No3 K56	Page No4 K57	Wall ↑ ↓ Inside
Tastrak No3 T129	Tastrak No4 T130	Tastrak No3 T134	Tastrak No4 T135	Tastrak No3 T139	Tastrak No4 T140	
TD-1 No3 Z48	TD-1 No4 Z49	TD-1 No3 Z53	TD-1 No4 Z54	TD-1 No3 Z58	TD-1 No4 Z59	
WALL-JAXA- 303	WALL-JAXA- 304	WALL-JAXA- 308	WALL-JAXA- 309	WALL-JAXA- 313	WALL-JAXA- 314	
DLR BIII	DLR BII	DLR BIII	DLR BII	DLR BIII	DLR BIV	
Spc-ICC SPD Big IFJ 1	Spc-ICC SPD Big IFJ 2	Spc-ICC IFJ 1 SPD Med	Spc-ICC IFJ 2 SPD Med	Spc-ICC SPD IFJ 1 small	Spc-ICC SPD IFJ 2 small	

- Wall detectors

- Thickness of AERI stacks: 1.4 mm



14th May 2008 – 24th October 2008

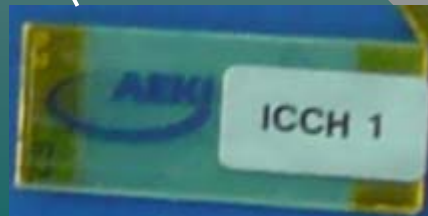
Position of the AERI detectors 2. (ICCH-CR-39) – in PIRS Docking Module

Main stack
(1):

IC3-T001
IC3-B001
TTS-1
OSU-5-1
JSC-5-1
ICCH1, ICCH2 ICCH3 ICCH4
Page No1 K33
Tastrak No1 116T
TD-1 No1 Z35
ATP No1 A116
CR39ICCHI-JAXA-301
DLR ICC I
SpC-ICC IFJ1

Wall detectors:

Wall #1 IC 1	Wall #2 IC 2	Wall #3 IC 3	Wall #4 IC 4	Wall #5 IC 5	Wall #6 IC 6	
IC3-W-T-001	Page No1 K44	IC3-W-T-003	Page No1 K49	IC3-W-T-005	Page No1 K54	Wall ↑ ↓ Inside
IC3-W-B-001	Tastrak No1 T127	IC3-W-B-003	Tastrak No1 T132	IC3-W-B-005	Tastrak No1 T137	
CRSI-OSU-1-2	TD-1 No1 Z46	CRSI-OSU-2-2	TD-1 No1 Z51	CRSI-OSU-3-2	TD-1 No1 Z56	
CRSI-JSC-1-2	WALL-JAXA-301	CRSI-JSC-2-2	WALL-JAXA-306	CRSI-JSC-3-2	WALL-JAXA-311	
Box 1 1	DLR BV	Box 1 3	DLR BV	Box 1 5	DLR BI	
	SI3 SPD Big IFJ 1		SI3 SPD Med IFJ 1		SI3 SPD IFJ 1 small	



Thickness of AERI stacks: 3 mm

Thickness of AERI stacks: 1.4 mm

ETCHING METHOD

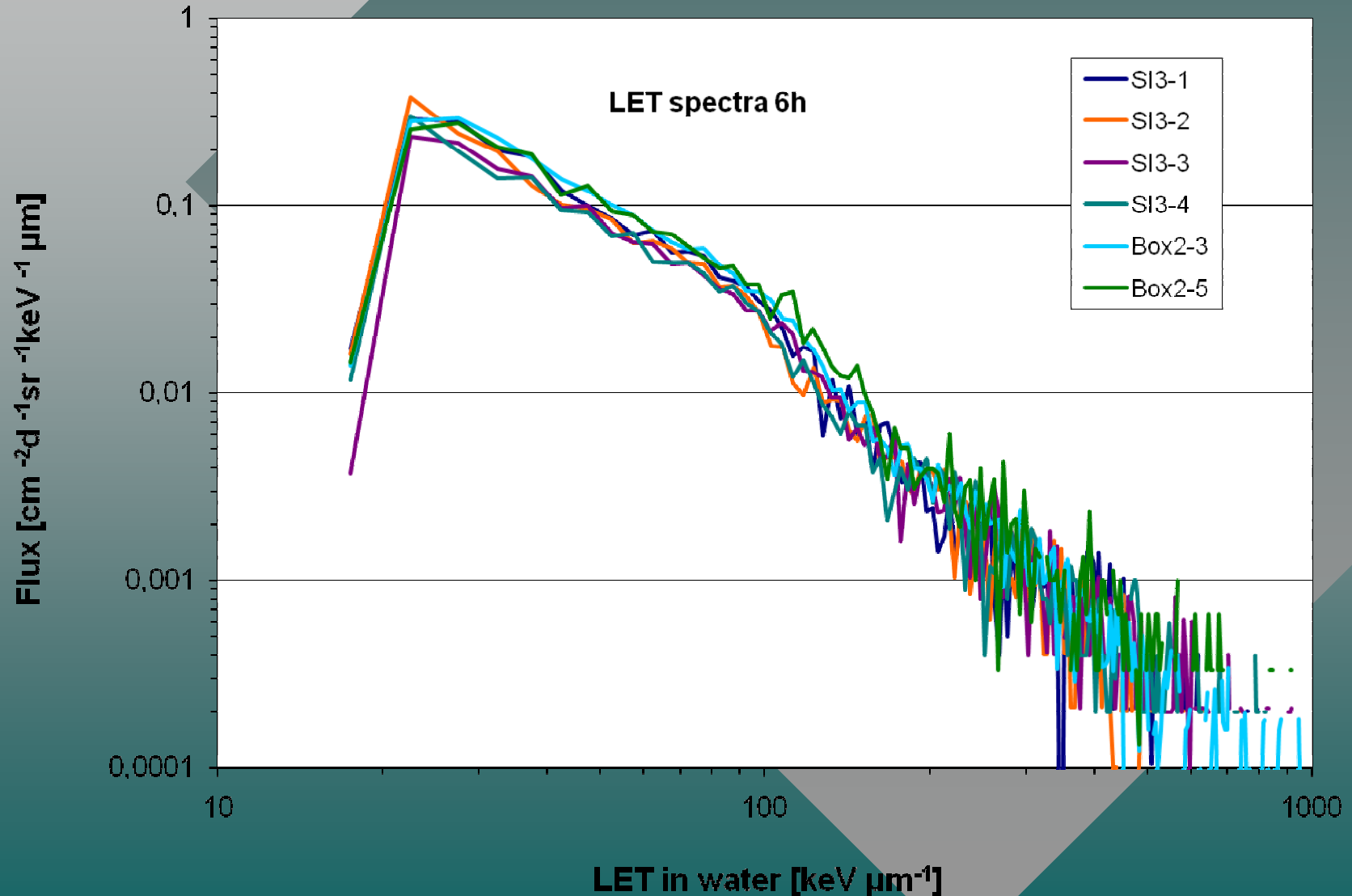
- In 6 N NaOH, 70 °C
- Detector material: polyallyl-diglycol-carbonate (PADC, Tastrak)
- Thickness of detectors: 1 mm
- 6h: to measure the short range and high LET particles, 8 μm removal
- +9h=15h: to measure lower LET particles, 20.1 μm removal

INVESTIGATIONS AND CALCULATIONS

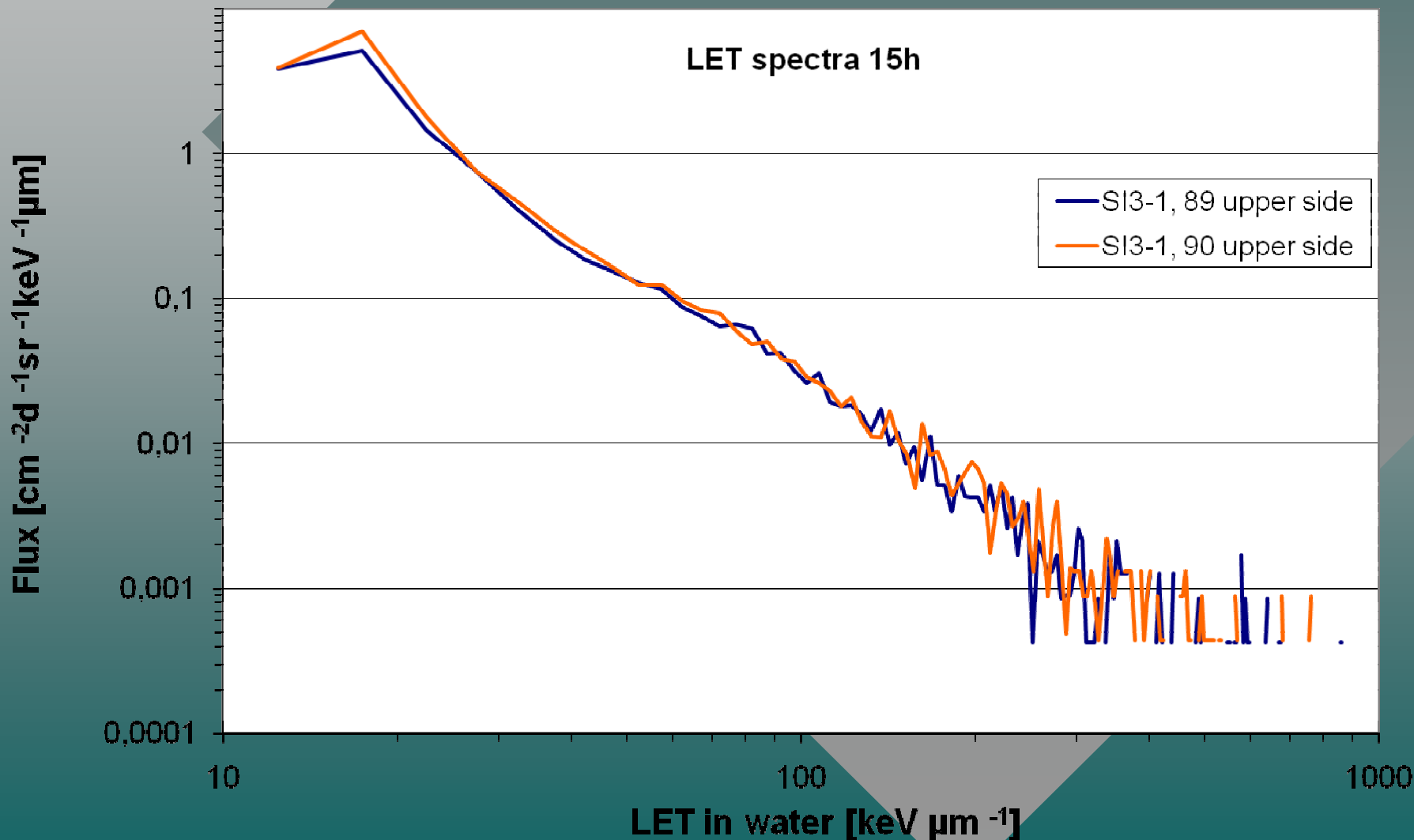
- Semi-automatic measurements using the VIRGINIA image analyzer and optical microscope → geometrical and optical parameters → V
- Calibration curves (6h, 15h) – converting the track etch rate ratio (V) obtained from the track parameters into LET
- Using standard calculation method → Φ (L), D , H , $Q=H/D$
- Manual measurements → HZE



LET SPECTRA (SI3)- 6h etching time



LET SPECTRA (SI3) - 15h etching time



DOSE VALUES (SI3): results obtained after 6h etching (≥ 17.5 keV/ μm)

stack	D $\pm 1\sigma$ [mGy]	H $\pm 1\sigma$ [mSv]	D rate $\pm 1\sigma$ [$\mu\text{Gy/d}$]	H rate $\pm 1\sigma$ [$\mu\text{Sv/d}$]	Q $\pm 1\sigma$
SI3-1	2.05 \pm 0.06	35.12 \pm 0.89	12.67 \pm 0.38	216.8 \pm 5.5	17.12 \pm 0.37
SI3-2	1.83 \pm 0.13	31.09 \pm 2.38	11.27 \pm 0.79	191.9 \pm 14.7	17.02 \pm 0.23
SI3-3	1.88 \pm 0.14	32.89 \pm 2.22	11.60 \pm 0.89	203.0 \pm 13.7	17.51 \pm 0.35
SI3-4	1.84 \pm 0.16	32.06 \pm 3.08	11.38 \pm 0.99	197.9 \pm 19.0	17.39 \pm 0.21
Box2-3	2.12 \pm 0.20	37.51 \pm 2.82	13.11 \pm 1.26	231.6 \pm 17.4	17.74 \pm 0.30
Box2-5	2.27 \pm 0.20	40.87 \pm 3.29	13.99 \pm 1.25	252.3 \pm 20.3	18.04 \pm 0.16

DOSE VALUES (SI3): combined results of 6 and 15h etching (≥ 10 keV/ μm)

stack	D $\pm 1\sigma$ [mGy]	H $\pm 1\sigma$ [mSv]	D rate $\pm 1\sigma$ [$\mu\text{Gy}/\text{d}$]	H rate $\pm 1\sigma$ [$\mu\text{Sv}/\text{d}$]	Q $\pm 1\sigma$
SI3-1	6.21 ± 0.52	61.60 ± 2.36	38.32 ± 3.19	380.2 ± 14.5	9.94 ± 0.45

Only the evaluation of the first stack has been completed.

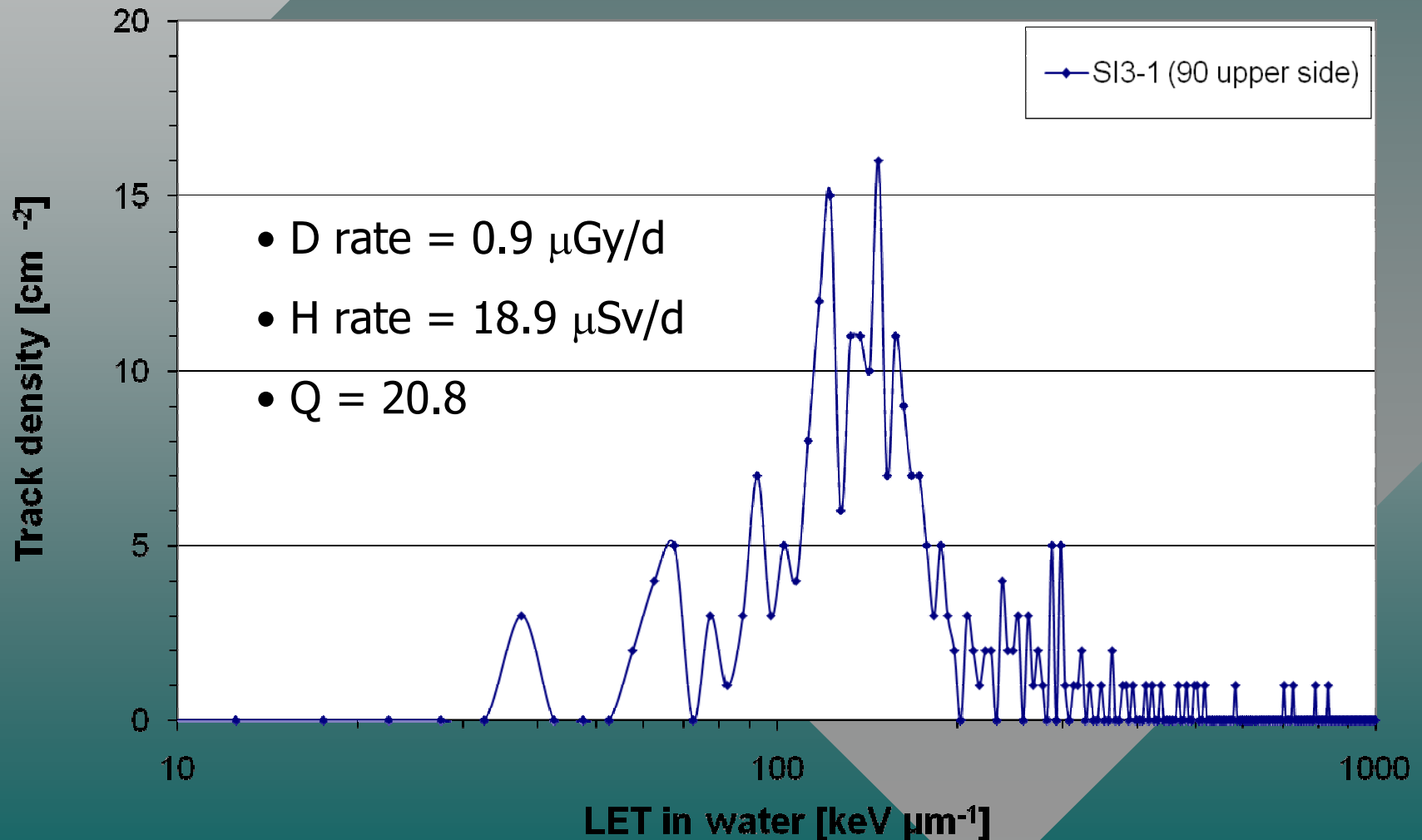
DOSE VALUES (ICCH-CR-39): results obtained after 6h etching (≥ 17.5 keV/ μm)

- Only the evaluation of the first stack has been completed.
- The detectors were placed in PIRS Docking Module.

stack	$D \pm 1\sigma$ [mGy]	$H \pm 1\sigma$ [mSv]	$D \text{ rate} \pm 1\sigma$ [$\mu\text{Gy/d}$]	$H \text{ rate} \pm 1\sigma$ [$\mu\text{Sv/d}$]	$Q \pm 1\sigma$
ICCH-1	3.06 ± 0.06	53.26 ± 1.08	18.88 ± 0.39	328.78 ± 6.68	17.41 ± 0.30

stack	$D \pm 1\sigma$ [mGy]	$H \pm 1\sigma$ [mSv]	$D \text{ rate} \pm 1\sigma$ [$\mu\text{Gy/d}$]	$H \text{ rate} \pm 1\sigma$ [$\mu\text{Sv/d}$]	$Q \pm 1\sigma$
SI3	1.90 ± 0.10	32.79 ± 1.72	11.73 ± 0.64	202.4 ± 10.6	17.26 ± 0.23

Distribution of the manually measured HZE tracks



Acknowledgement

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Thank you for your attention!

