

WRMISS Berkeley, September 2003

**DOSIMETRY AND MICRODOSIMETRY ON THE
BOARD OF SPACE STATIONS – 2001-2003**

František SPURNÝ

*Nuclear Physics Institute – Department of Radiation Dosimetry,
Academy of Sciences of the Czech Republic, Prague*

Experiments performed 2001 - 2003

1. ISS –Russian module

Exposed set of passive detectors – TLD's, LET spectrometer based on chemically etched PADC and Si-diodes

2. Shuttle STS 112 flight

Comparison of several track-etched detectors to measure neutrons and/or to establish LET spectra

3. Calibrations

- **Icchiban 2 and Icchiban 4**
- **JINR Dubna: C, Mg, Fe ions**
- **CERF reference high energy field**

**All – to get more precise LET calibration curve
- to verify LET dependence of TL yield**

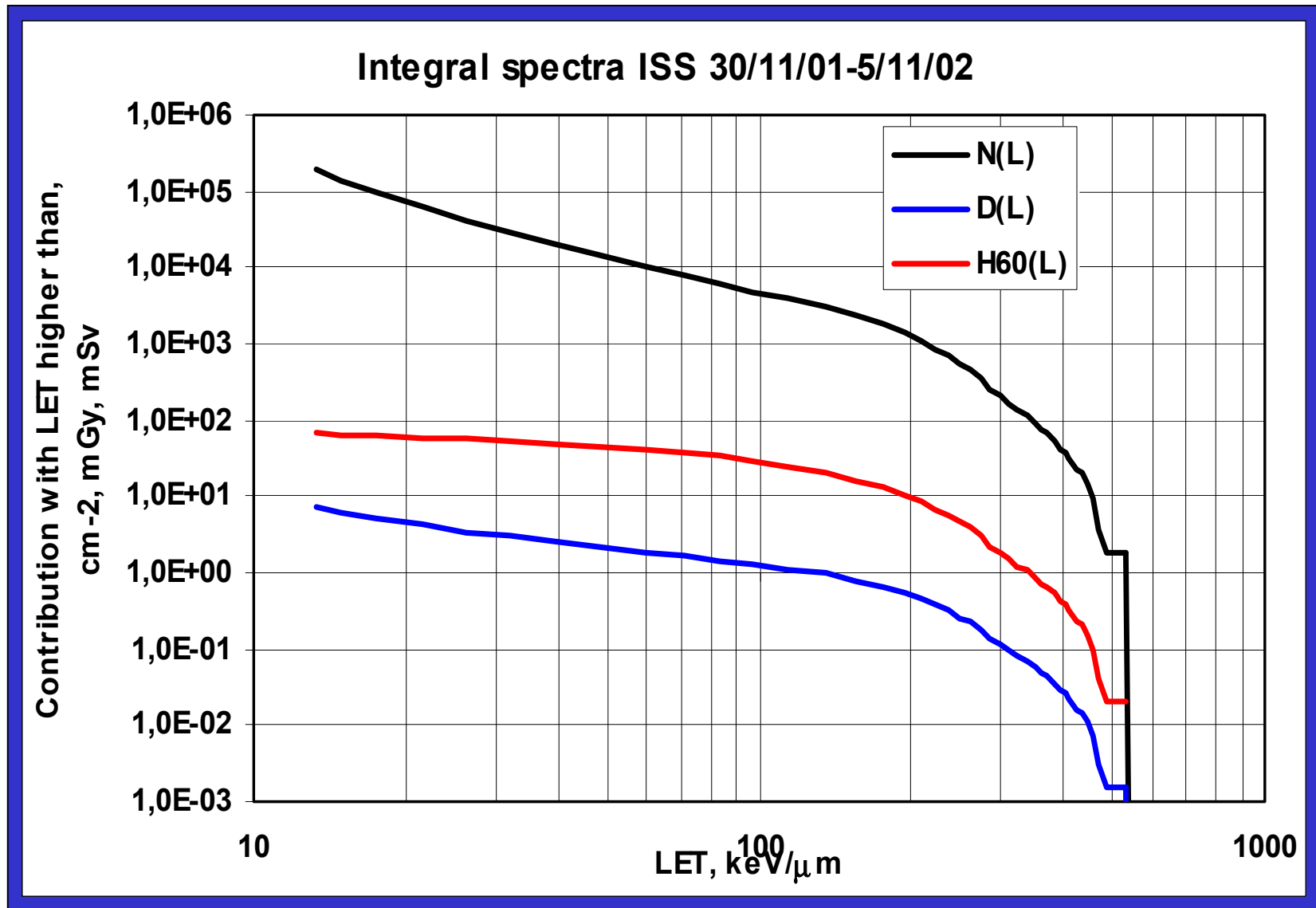
RECENT RESULTS IN SPACE - ISS 2001-2002

Operation	Set No.	
	A	B
Junction PROGRESS to ISS	30.11.01	30.11.01
Positioning for exposure	05.01.02	03.11.02
Time of exposure total, days	156	328
Landing	07.01.02	05.11.02

	LET	spectrometer	TLD'S
Detector's set	D, $\mu\text{Gy}/\text{day}$	H(60), $\mu\text{Sv}/\text{day}$	H(60), $\mu\text{Sv}/\text{day}$
A	9.2 ± 0.9	78.6 ± 0.9	14.4 ± 0.8
B - 1	21.6 ± 1.2	202 ± 12	21.7 ± 1.5
B - 2	11.1 ± 0.7	75.9 ± 5.2	-

Remarks - no reliable Si-diode signal after 328 days, exact position of B-samples not known

RECENT RESULTS IN SPACE - ISS russian module



STS 112 results

Operation	Date	Time
Launch	October 7	2:46 p.m., CDT
Docking	October 9	10:17 a.m., CDT
Undocking	October 16	8:13 a.m., CDT
Landing	October 18	10:44 a.m., CDT

Total flight duration: 10.832 days; Altitude: 390 km; Inclination: 51.6°.

NPI AS CR used PADC LET spectrometer

H measured:

(2.29 ± 0.27) mSv (Pershore- above 8 keV/μm);

(1.58±0.46) mSv (Tastrak- above 15 keV/μm)

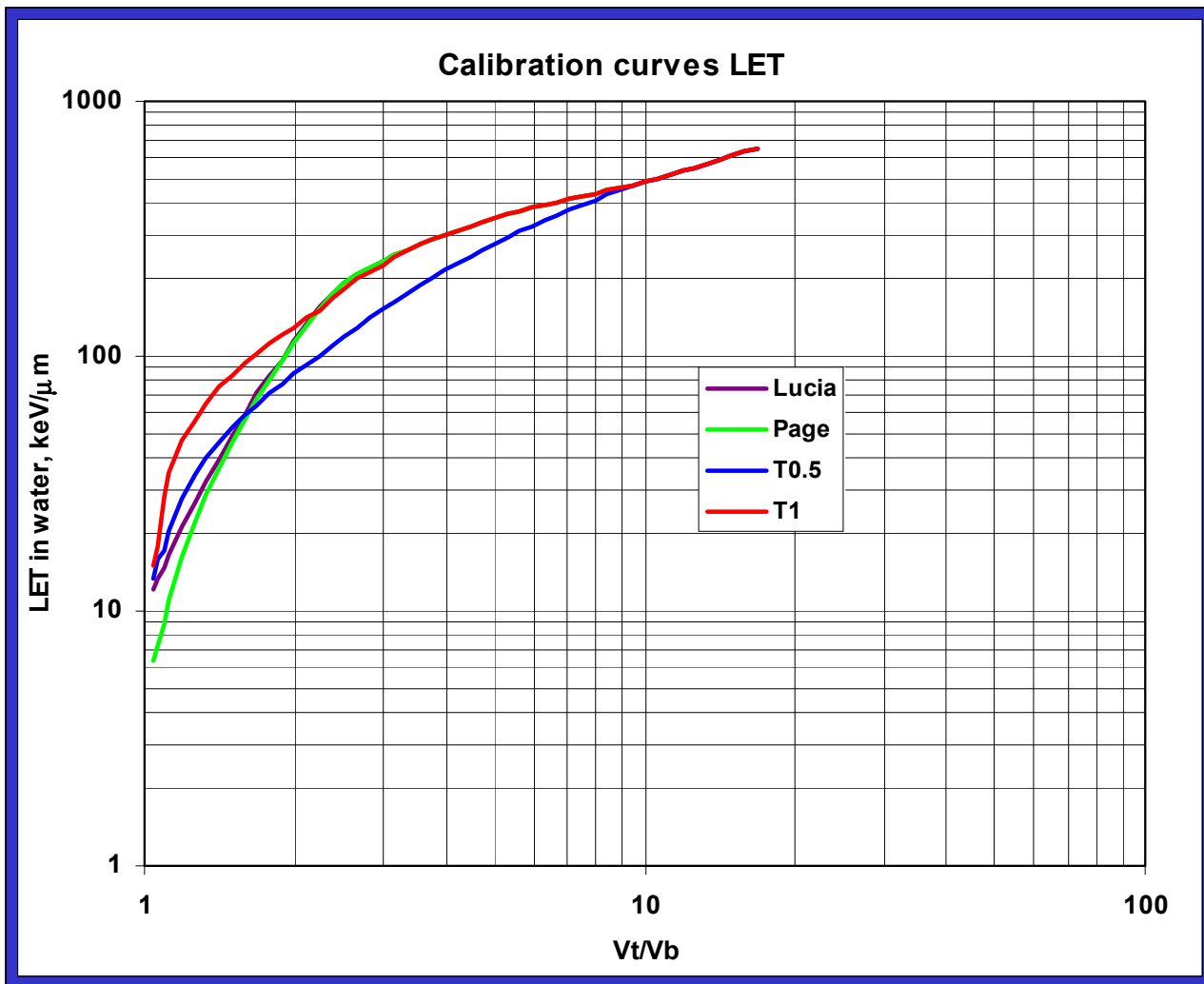
Discussed at this meeting together with the results of other participants

CALIBRATION OF INSTRUMENTS

- **Dubna accelerators - synchrophasotron, phasotron, nuclotron - since 1977 (collaboration JINR Dubna, IMBP, RTC RS CO-both Moscow)**
- **ICCHIBAN – 2002, 2003**
both – LET calibration curves for PADC LET spectrometers
- **CERF high energy reference fields**

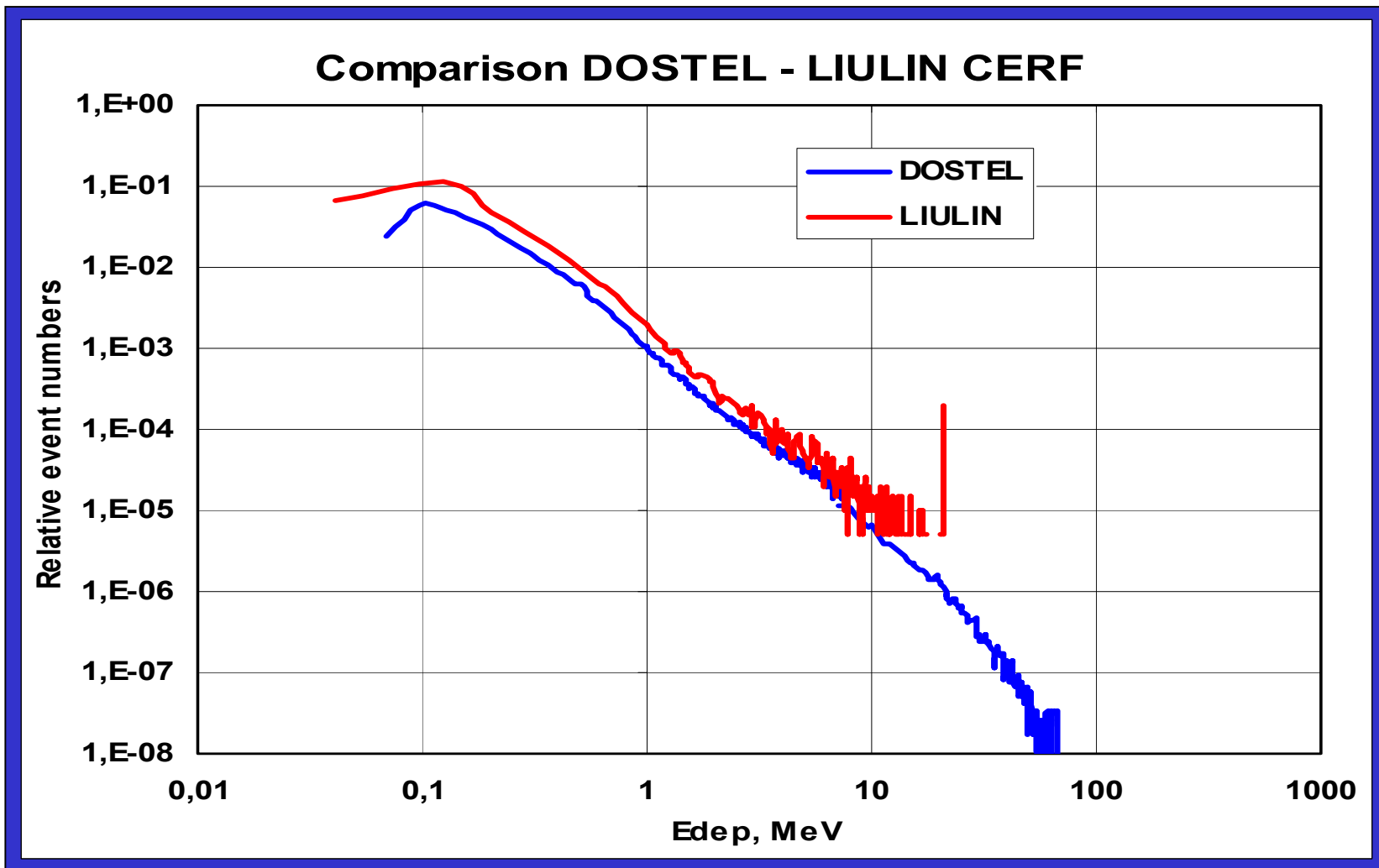
ICHIBAN 2002/2003 + JINR exposures

Modified LET calibration curves



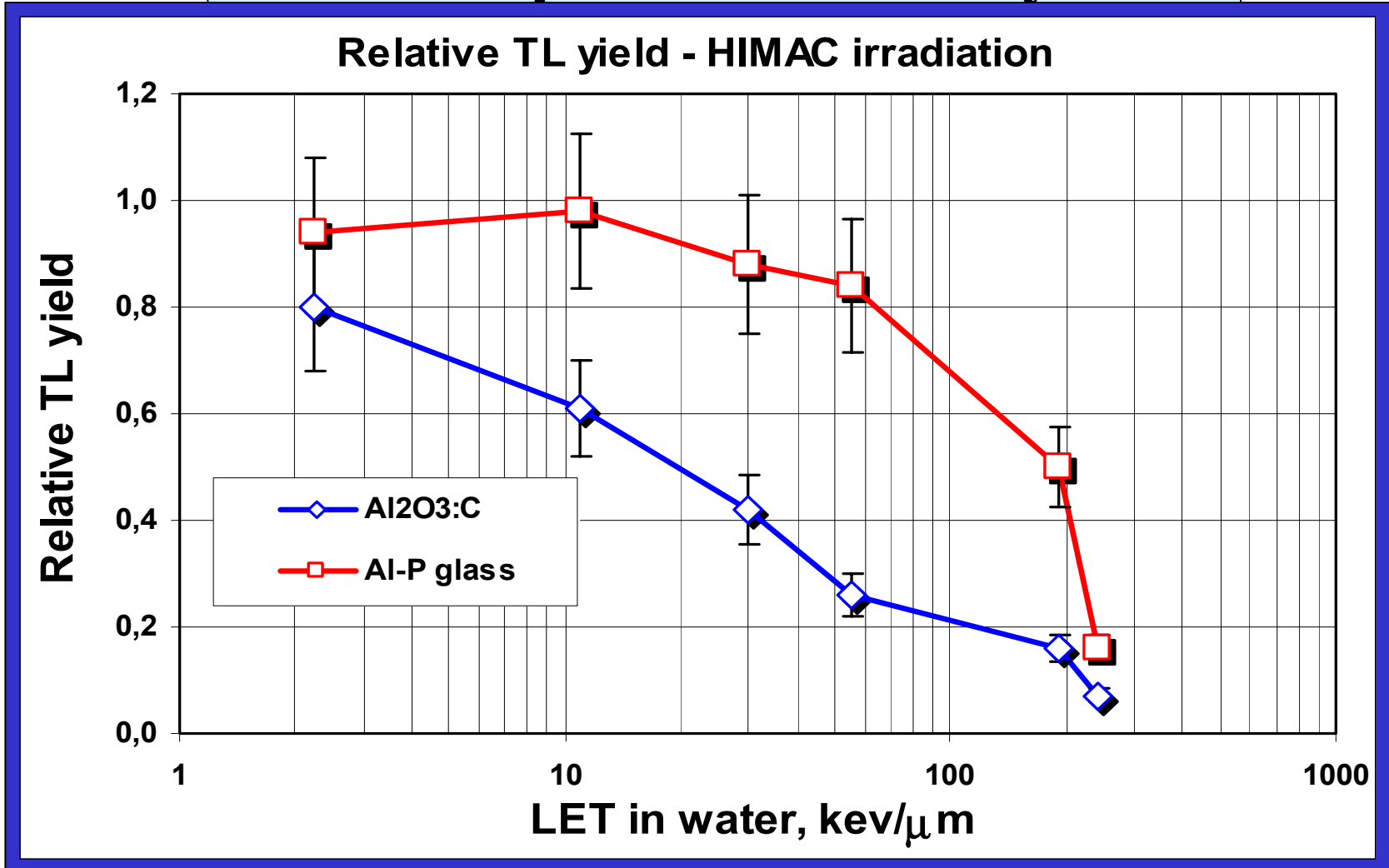
Lucia – Pershore 0.5 mm
Page - new PADC, 0.5 mm
T 0.5 – Tastrak, 0.5 mm
T 1 – Tastrak 1 mm

DOSTEL - LIULIN: Event spectra in CERF field - quantitative comparison in course



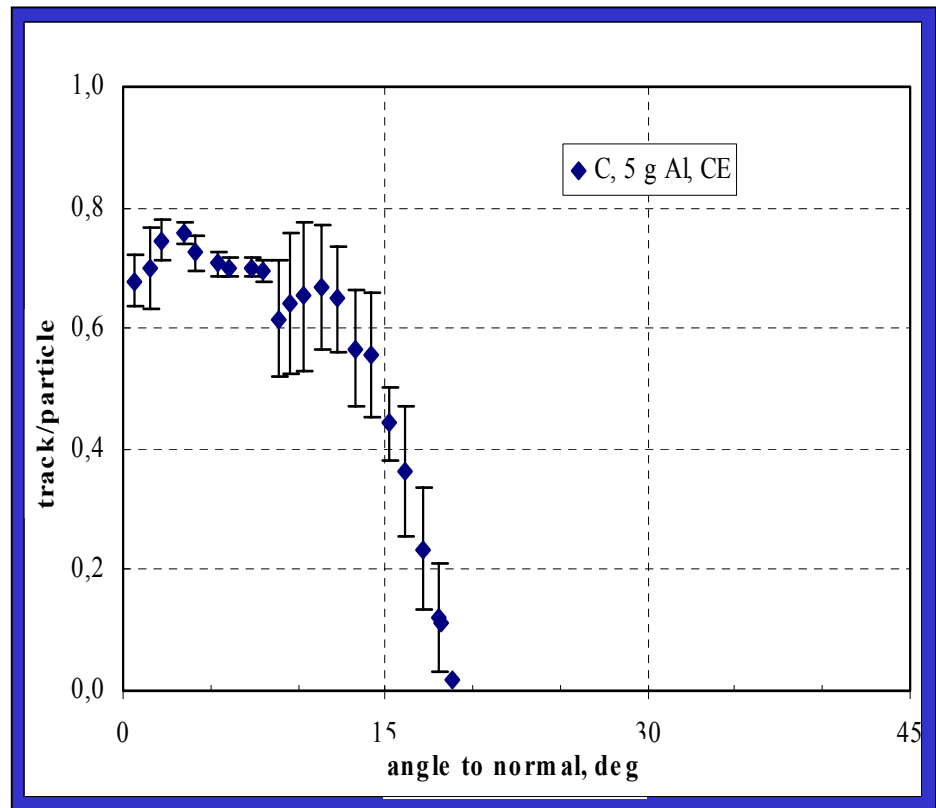
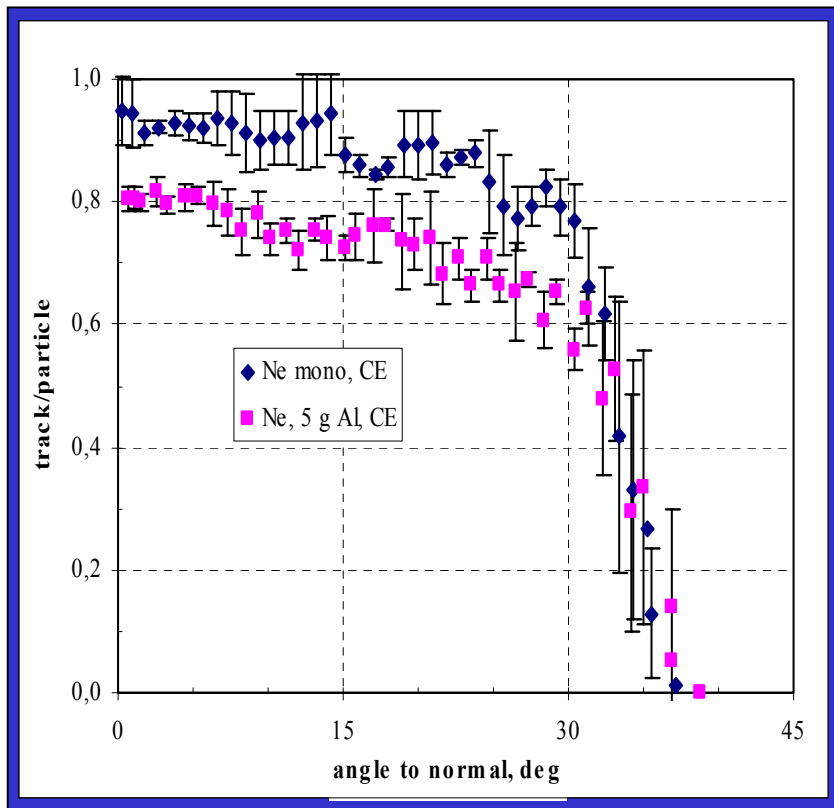
ICHIBAN 2 and 4

LET dependence of TL yield



WRMISS Berkeley, September 2003

ICHIBAN 4 - Angular dependence of detection, C and Ne-ions, (PADC-Page, 0.5 mm, chemical etching)



FUTURE ACTIVITIES

- **Flight opportunities - all new welcomed**
detectors sets ~ 10 g's, flexible dimensions
exposure time: 1 to 2 months sufficient with the
exception of Si-diodes - for them > 1 year
- **Calibration campaigns - all new welcomed**
HIMAC 2003 will be finished soon, CERF 2003 runs as well,
another exposures at JINR accelerators planned, DOSMAX
calibration will continue