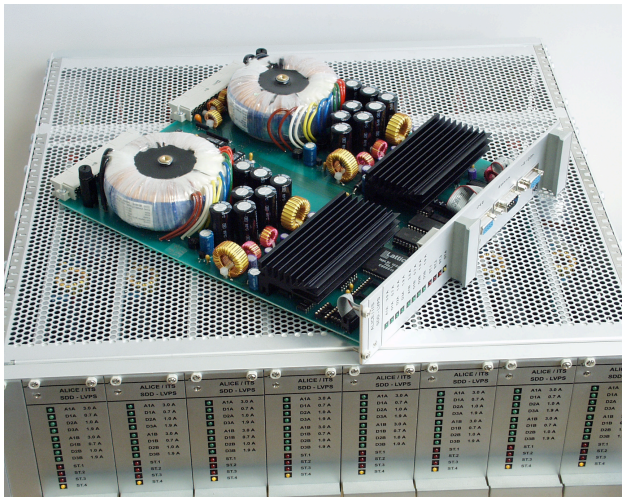
AREM pro. LVPS radiation test

Vladimír Wagner



SDD LVPS work place: cavern

LVPS - Complicated electronic system

Possibility of radiation damage

Radiation situation: Overall number of neutrons 1-2.2 x 10^6 neutrons per cm^2

8.4 x 10^7 neutrons per cm^2

Necessity of radiation tests in such conditions:

we placed crate with LVPS module to the neutron field produced by NPI cyclotron (proton energy up to 25 MeV, current ~ 10 _A)

Part of NPI during 2002 flows

Test scheme

Neutron source: cyclotron during production run (radiopharmaceutics production)

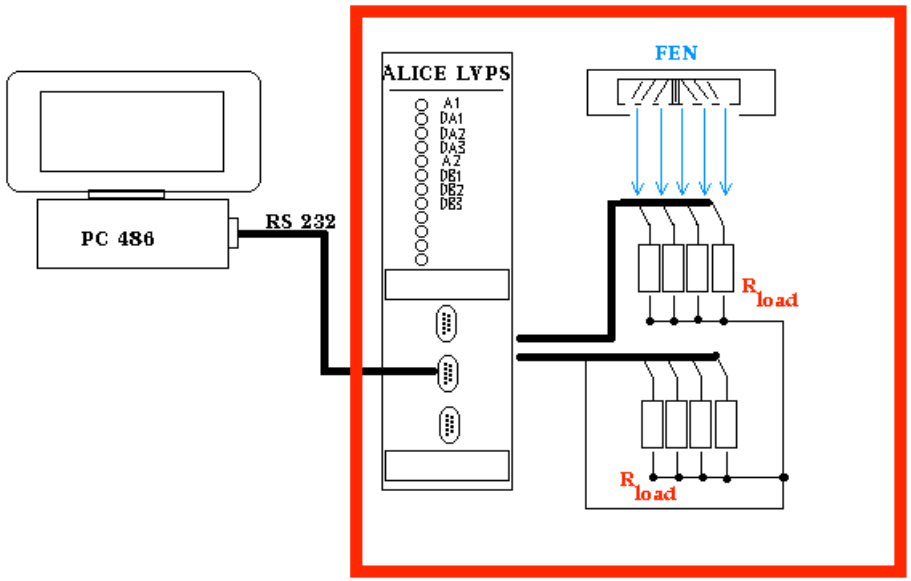
Tested device: crate with one LVPS module (No. 02.001)

LVPS load: stable test load simulated maximal load and voltage drop on the cables

Test control: on line reading of V_{LOAD} and I_{LOAD} every 10 sec and writing to file.

Before and after radiation test were done long term reliability tests of used modul!

Inside cyclotron cavern



Neutron field determination

Used method: activation foils measurement

Used foils:

Foil	Reaction	Produced isotop	Energy range	Cross		[M
		□				
		□				
		□				

Result accuracy: approximate estimation of neutron numbers for different neutron range, order is fine

Test results

Number	Type of run	Datum	Start time	Irradiation duration	Beam		Neutron dose [hour] [A] [V] [10^9 ne
					□		

Overall number of neutrons: > 10^9 neutrons per cm^2

!!! LVPS module was working before, during and after radiation test without any problems !!!

Overall neutron number one - three orders higher than is expected by B. Pastircak simulations in cavern (SDD LVPS place)

Future plans: tests with more modules and also in more intensive neutron fields

More information: http://hp.ujf.cas.cz/~wagner/lvps/radiation.html

SDD LVPS at cavern

Crate: very simple, only source of electric power and communication lines

Module: all is made by software or automatically by hardware, all restarts, reboots, rewriting of calibration parameters, put on or off ----- no necessity and also possibility to make it manually

Access is advantage only in the case of crate or module destroy and necessity to change them

Long term reliability tests (many months) and first radiation tests did not show problems (any problem not resolved by software, any problem endangering detector electronic were detected up to now)

Assumed SDD regulator: LHC 4913 - tested by CERN in radiation fields