

FAST NEUTRON FACILITIES FOR RADIOLOGICAL IRRADIATIONS IN THE "RUDJER BOŠKOVIĆ" INSTITUTE

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The accelerator facilities of the "Rudjer Bošković" Institute have been tested for neutron fields and possibilities of applications in radiobiology. The neutron fields have been mapped and the γ -component determined. Special care has been taken to set up instrumentation and methods for the neutron and γ dosimetry: tissue-equivalent ionization chamber, chemical dosimeter, proton-recoil detector, associated α -particles measurement, Geiger-Müller counter, thermoluminescent device. So far the facilities have been used to irradiate cell cultures and mice. The characteristics of the facilities are given in Table I.

Table I

	neutron generator	cyclotron
neutron producing reactions	$d+t \rightarrow n+\alpha + 17.6 \text{ MeV}$	$d+Al \rightarrow Si+n+9.35 \text{ MeV}$
max.deut.energy	300 keV	16 MeV
beam current	400-900 μA	200 μA
angular distribution	isotropic	anisotropic - -forward peaked
energy spectrum	monoenergetic 14 MeV	mean energy 2.5 MeV
γ -contamination	5%	10-20%
D_{tot}^x		
0.1 m	5-8 rad/min	15 rad/min
1 m	0.1 rad/min	7 rad/min
1.4 m		
possibilities of the biological samples irradiations	12 samples of cell- cultures of 4 mice with $\sim 5 \text{ rad/min}$	20 mice with different aps. doses. For 7 rad/min there is a field $35 \times$ 60 cm with homogeneity of $\pm 10\%$

^x D_{tot} = Total (n+ γ) absorbed dose rate for tissue in air
at the specified target distances.