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Belgian Nuclear Research Centre

Your partner for a very broad spectrum of irradiation conditions

www.sckcen.be
business@sckcen.be

Neutron irradiations: BR2

Fluxes at 60 MW reactor power (typical value, configuration dependent); reactor power up to 120 MW possible.
Various temperatures and environments (gas, water,…) possible, depending on the rig.
Fuel height 760 mm; flux gradient < 20% over about 350 mm.
Very flexible core configuration, with up to 79 available channels for experimental rigs.

	thermal neutron flux (n/cm²s)	fast neutron flux (>1MeV) (n/cm²s)	gamma heating rate (W/g Al)	diameter (m m)
central channel H	up to 1,0E+15	1,8E+14	3	200
peripheral channel H	3E+14	1,3E+14	0,1	200
peripheral channel P	0,7 - 1,5E+14	0,5 – 1,0E+13	0,4 - 1	50
standard channel S	1,0 - 3,5E+14	0,1 - 0,7E+14	0,9 – 2,3	84
BR2 - fuel channel	1,0 - 3,5E+14	0,5 – 2,8E+14	1,7 – 8,8	25,4 – 32

Neutron irradiations: BRI

Fluxes at 700 kW reactor power; reactor power can vary between 0 and 700 kW, up to 1 MW also possible for about 3 hours
Temperature: ~ 30 °C; air-cooled reactor

	Approximate thermal neutron flux (n/cm²s)	Approximate epithermal neutron flux (n/cm²s)	Approximate fast fission neutron flux (n/cm²s)	available volume (m m)
BR1 - Y3 channel	2E+11	1,5E+11	2E+10	400 x 80 x 80
BR1 - Y4 channel	4E+11	1E+11	4E+09	400 x 80 x 80
BR1 - spherical cavity	7E+08	0	0	Ø 4 50
BR1 - spherical cavity + U -convert er	5E+07	1,5E+08	5E+08	Ø 4 0
BR1 – cylindrical converter MARK -3	0	0	2,5E+08	Ø 4 0; H=8 0

Note : additional equipment (LNK): ^{252}Cf and Am-Be neutron sources with ambient dose rate equivalent up to 0.3 mSv/h (2π; 75cm from source);
ISO 8529 spectra; ISO 17025 accreditation from BELAC

Gamma irradiations in the BR2 facility

From room temperature to 200°C.

	gamma source	gamma dose rate	volume (height / diameter)	remarks
BRIGITTE -A	Co-60	3 - 9 kGy/h	900 / 70 mm	height with gradient less than 10% ~80 mm
BRIGITTE -B	Co-60	3 - 7 kGy/h	900 / 190 mm	height with gradient less than 10% ~100 mm
RITA	Co-60	200 - 400 Gy/h	500 / 380 mm	height with gradient less than 10% ~150 mm
GEUSE	spent fuel	50 - 1400 Gy/h	500 / 360 mm	height with gradient less than 10% ~300 mm

Irradiations in the Laboratory for Nuclear Calibrations (LNK)

Room temperature

	Minimum - Maximum distance (m)	Beam collimation	Sources	Kair rate (2021-05-18)
Radiotherapy	0.8 m - 7 m	pyramid collimated beam (3 cm – 30 cm @ 1m)	1 Co-60	1.3 Gy/h – 94 Gy/h
Panoramic	0.5 m – 3.5 m	panoramic 2π (4π)	1 Co-60	18 mGy/h-800 mGy/h
			1 Cs-137	50 µGy/h-2 Gy/h
Horizontal	0.7 m - 6 m	conical beam 20°	4 Co-60	3 µGy/h - 5.6 mGy/h
			4 Cs-137	8 µGy/h - 128 mGy/h
Long term irradiations	0.5 m - 19 m	conical beam 40°	2 Co-60	3 mGy/h-350 mGy/h
			2 Cs-137	4 mGy/h-317 mGy/h
X-ray generator	0.5 m- 4 m	conical beam 20°	10-300 kV	<300 mGy/h (N-series) ~33 Gy/h H-250 @50 cm
Neutrons	0.7 m - 6 m	panoramic 2π (4π) along diagonal of room	2 Cf-252	H*(10) = 100 µSv/h -5 mSv/h
			1 Am-Be	H*(10)= 5 µSv/h - 150 µSv/h