

Parameters of the Solaris source: bending magnet and centre of straight section.

1. Bending magnet

Table 1. The characteristics of the radiation source located at the centre of the bending magnet

Electron energy	Energy of the electron beam	1.5 GeV
Average current	Average current of the electron beam	500 mA
Circumference	Circumference of the storage ring	96 m
Bunches	Number of bunches	32
σ_z	Bunch length (rms)	60 mm
Natural emittance	Natural emittance of the electron beam	5.982e-9 m*rad
Coupling constant	Coupling constant of the electron beam= vertical emittance/horizontal emittance	0.01
Energy spread	Energy spread of the electron beam (rms)	0.000745
β_x, β_y	Betatron function (at the centre of the source)	0.220 m, 15.78m
α_x, α_y	Lattice function to denote the slope of the phase ellipse of the electron beam (at the centre of the source)	0.2691, -1.1923
$\eta_x, \eta_y, \eta_x', \eta_y'$	Dispersion function (at the centre of the source)	0.0337 m, 0.0 m, 0.138 rad, 0.0 rad

Table 2. Parameters of the bending magnet

B	Magnetic field	1.309 T
Radius		3.82235 m
Fringe Field length		0.05 m

Table 3. Parameters of the bending magnet source (critical energy= 1959 eV)

Electron beam size:		
σ_x	Electron horizontal beam size	44.0 μm
σ_y	Electron vertical beam size	30.6 μm
Electron beam divergence:		
σ_x'	Horizontal electron beam divergence	198.6 μrad
σ_y'	Vertical electron beam divergence	3.014 μrad

Figure 1. The bending magnet source parameters calculated using SPECTRA software.

SPECTRA 9.0 - C:\Nauka\programy\Spectra\SOLARIS_new_BM.prm

File Select Calculation Run Open Utility Configuration Help

Accelerator Specification

Storage Ring

Bunch Profile: Gaussian Injection Condition: Default

Electron Energy (GeV)	1.5	Energy Spread	0.000745		
Average Current (mA)	500	$\beta_x(m)$	0.220	α_x	0.2691
Circumference	96	$\beta_y(m)$	15.78	α_y	-1.192
Bunches	32	$\eta_x(m)$	0.0337	η_x'	0.138
σ_z (mm)	60	$\eta_y(m)$	0.0	η_y'	0.0
Peak Current (A)	9.97355	$1/\gamma(\mu rad)$	340.666		
Natural Emittance (m.rad)	5.982e-9	$\sigma_x(\mu m)$	43.97	$\sigma_x'(\mu rad)$	198.6
Coupling Constant	0.01	$\sigma_y(\mu m)$	30.57	$\sigma_y'(\mu rad)$	3.014
$\varepsilon_x(m.rad)$	5.923e-009	$\gamma\sigma_x'$	0.5830	$\gamma\sigma_y'$	8.848e-003
$\varepsilon_y(m.rad)$	5.923e-011				

Light Source Description

Bending Magnet

B(T)	1.309	Critical Energy (eV)	1958.66
Bending Radius (m)	3.82235	Total Power/Revolution (kW)	58.5812
Nominal Field Length (m)	1	Linear Power Density (kW/mrad)	0.00932348
Fringe Field Length (m)	0.05		

2. The centre of the straight section

Table 4. Parameters of the Storage ring

Electron energy	Energy of the electron beam	1.5 GeV
Average current	Average current of the electron beam	500 mA
Circumference	Circumference of the storage ring	96 m
Bunches	Number of bunches	32
σ_z	Bunch length (rms)	60 mm
Natural emittance	Natural emittance of the electron beam	5.895e-9 m*rad
Coupling constant	Coupling constant of the electron beam= vertical emittance/horizontal emittance	0.01
Energy spread	Energy spread of the electron beam (rms)	0.000745
β_x, β_y	Betatron function (at the centre of the source)	5.707m, 1.638 m
α_x, α_y	Lattice function to denote the slope of the phase ellipse of the electron beam (at the centre of the source)	0.0, 0.0
$\eta_x, \eta_y, \eta_x', \eta_y'$	Dispersion function (at the centre of the source)	-0.0016 m, 0.0 m, 0.0 rad, 0.0 rad

Table 5. Parameters of the electron beam at the centre of the straight section

Electron beam size:		
σ_x	Electron horizontal beam size	182.5 μm
σ_y	Electron vertical beam size	9.78 μm
Electron beam divergence:		
σ_x'	Horizontal electron beam divergence	32.0 μrad
σ_y'	Vertical electron beam divergence	5.969 μrad