

Iřınım Kaynakları İin Benzetim Programları I: SPECTRA

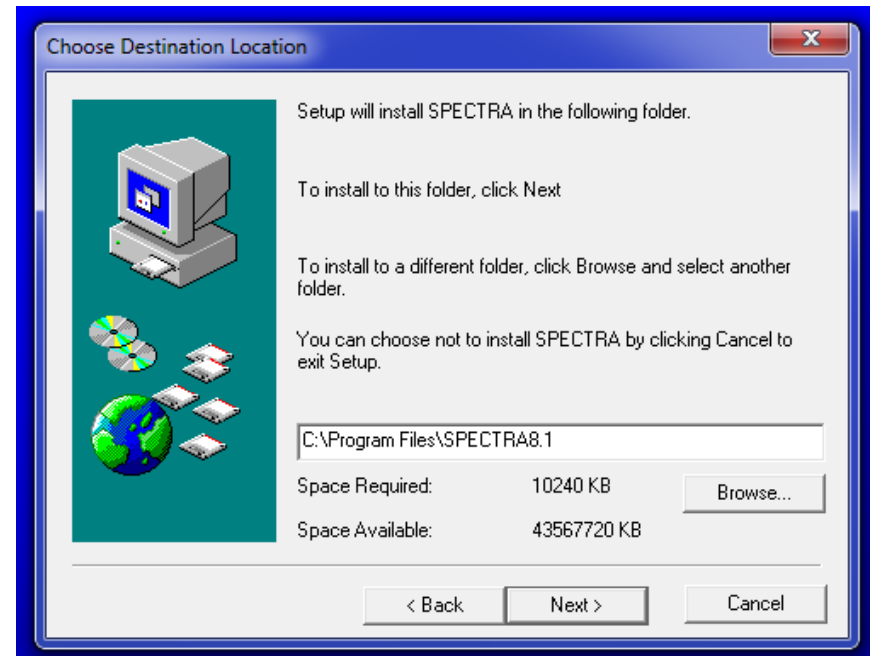
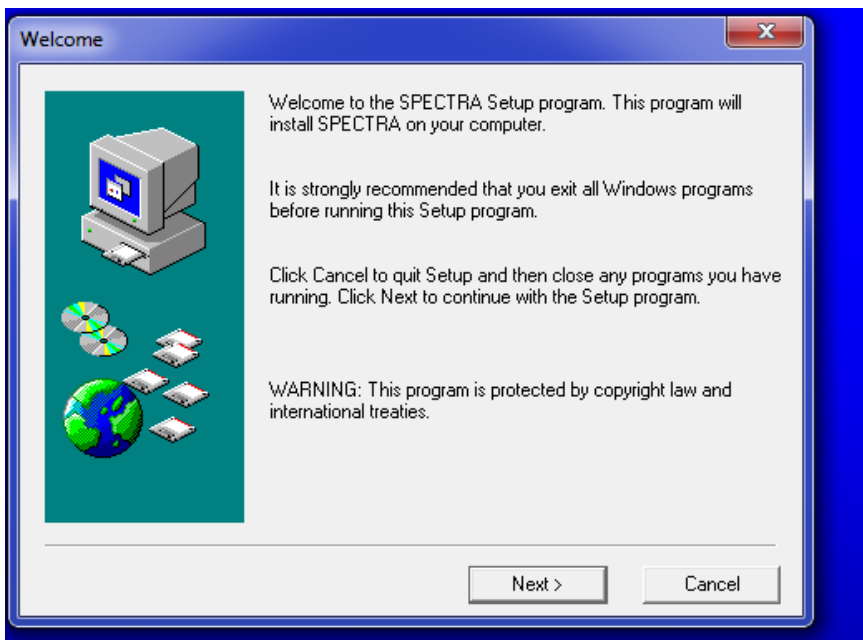
Yrd. Do. Dr. Zafer Nergiz
NiĐde Üniversitesi, Fizik Bölümü

SPECTRA

- Sinkrotron Işınım kaynaklarında undulatör, wiggler ve eğici magnetlerden üretilecek ışınımın özelliklerini belirlemede kullanılır.
- Spring-8'den T. Tanaka ve H. Kitumura tarafından yazılmıştır.

<http://radiant.harima.riken.go.jp/spectra/>

Programın kurulması



SPECTRA 8.1 - C:\Program Files (x86)\SPECTRA8.1\prm\lhec\storage_ring.prm

File Select Calculation Run Open Utility Configuration Help

Accelerator Specification

Storage Ring

Bunch Shape: Gaussian Energy Spread 0.0011

Electron Energy (GeV)	8	$\beta_x(m)$	24	α_x	0
Average Current (mA)	100	$\beta_y(m)$	5.8	α_y	0
Circumference	1435	$\eta_x(m)$	0	η_x'	0
Bunches	2436	$\eta_y(m)$	0	η_y'	0
σ_z (mm)	20				
Peak Current (A)	1.17505	$1/\gamma(\mu rad)$	63.8749		
Natural Emittance (m.rad)	5.9e-9	$\sigma_x(\mu m)$	375.7	$\sigma_x(\mu rad)$	15.66
Coupling Constant	0.003	$\sigma_y(\mu m)$	10.12	$\sigma_y(\mu rad)$	1.744
$\epsilon_x(m.rad)$ 5.882e-09		$\gamma\sigma_x'$	0.2451	$\gamma\sigma_y'$	0.02731
$\epsilon_y(m.rad)$ 1.765e-11					

Light Source Description

Linear Undulator

Link Gap & Field
 Segmented Undulator
 Special Magnet Setup

Gap Value	20	$\sigma_r(\mu m)$	2.19789	$\sigma_r(\mu rad)$	3.08254
B(T)	0.26105	$\Sigma_x(\mu m)$	375.741	$\Sigma_x(\mu rad)$	15.9562
Periodic Length (cm)	3.2	$\Sigma_y(\mu m)$	10.353	$\Sigma_y(\mu rad)$	3.54184
Total Length (m)	4.5	$\epsilon_{1st}(peak:eV)$	14525		
Number of Periods	140	$\epsilon_{3rd}(peak:eV)$	43642.4		
K Value	0.78	Flux _{1st}	4.11454e+14		
$\epsilon_{1st}(eV)$	14562.7	Brilliance _{1st}	4.74079e+19		
		Peak Brilliance	5.57064e+20		
		Bose Degeneracy	0.00014334		
		Total Power (kW)	1.23622		

SPECTRA 9.0 - C:\Users\zafer\Desktop\spectra_input\gnu_grafar\kring5.prm

File Select Calculation Run Open Utility Configuration Help

Accelerator Specification

Storage Ring

Bunch Profile: Gaussian

Electron Energy (GeV)	3.00	Energy Spread (%)	0.0000
Average Current (mA)	500	$\beta_x(m)$	12.70
Circumference	477	$\beta_y(m)$	7.5
Bunches	795	$\eta_x(m)$	0.09
σ_z (mm)	2.2	$\eta_y(m)$	0
Peak Current (A)	54.4011	$1/\gamma(\mu rad)$	170.333
Natural Emittance (m.rad)	0.51e-9	$\sigma_x(\mu m)$	91.86
Coupling Constant	0.01	$\sigma_y(\mu m)$	6.154
$\epsilon_x(m.rad)$ 5.050e-010	$\epsilon_y(m.rad)$ 5.050e-012	$\gamma\sigma_x'$	0.03702
		$\gamma\sigma_y'$	0.0048172

Light Source Description

Linear Undulator

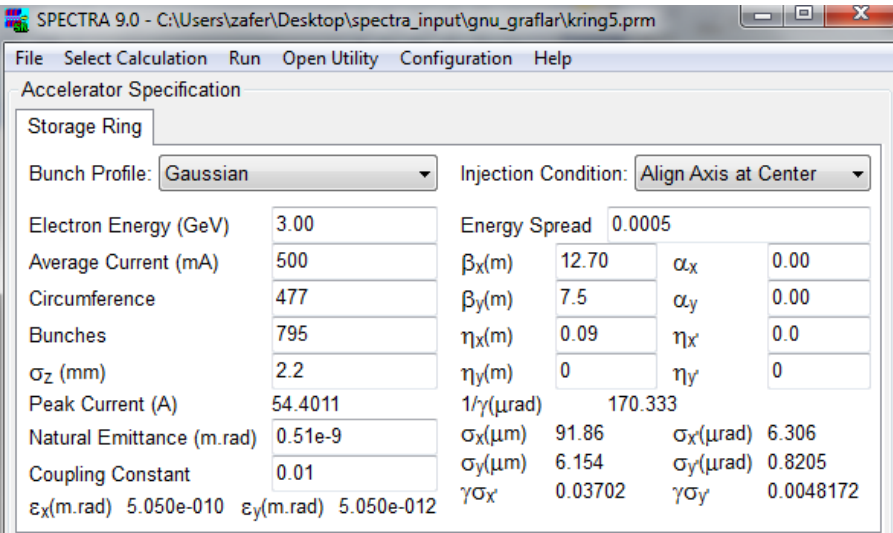
Link Gap & Field
 Segmented Undulator
 Special Magnet Setup

Gap Value	5	$\sigma_r(\mu m)$	6.83128	$\sigma_r(\mu rad)$	10.7413
B(T)	1.33872	$\Sigma_x(\mu m)$	92.1116	$\Sigma_x(\mu rad)$	12.4553
Periodic Length (cm)	1.8	$\Sigma_y(\mu m)$	9.19444	$\Sigma_y(\mu rad)$	10.7726
Total Length (m)	4.0	$\epsilon_{1st}(peak:eV)$	1344.05		
Number of Periods	222	$\epsilon_{3rd}(peak:eV)$	4032.95		
K Value	2.25	Flux _{1st}	7.13795e+015		
$\epsilon_{1st}(eV)$	1344.61	Brilliance _{1st}	1.59111e+021		
		Peak Brilliance	1.73116e+023		
		Bose Degeneracy	56.589		
		Total Power (kW)	20.3896		

Configuration

- Beamline
- Accelerator
- Light Source
 - Source Type
 - Linear Undulator
 - Vertical Undulator
 - Helical Undulator
 - Elliptic Undulator
 - Figure-8 Undulator
 - Wiggler
 - EMPW
 - Bending Magnet
 - Asymmetric Figure-8 Undulator
 - Multipole Field
 - Field Mapping
 - Periodic: User Defined
 - User Defined
 - Solve Equation of Motion
 - Duplicate
 - Change Name
 - Delete
 - Sort
 - Untitled
- Calculation Control

EĞİCİ MAGNET İŞİNİMİNİ İNCELEYELİM



SPECTRA 9.0 - C:\Users\zafer\Desktop\spectra_input\gnu_graflar\kring5.prm

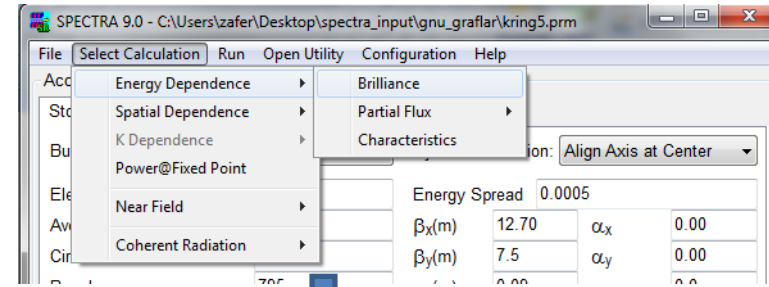
File Select Calculation Run Open Utility Configuration Help

Accelerator Specification

Storage Ring

Bunch Profile: Gaussian Injection Condition: Align Axis at Center

Electron Energy (GeV)	3.00	Energy Spread	0.0005	
Average Current (mA)	500	$\beta_x(m)$	12.70	α_x 0.00
Circumference	477	$\beta_y(m)$	7.5	α_y 0.00
Bunches	795	$\eta_x(m)$	0.09	η_x' 0.0
σ_z (mm)	2.2	$\eta_y(m)$	0	η_y' 0
Peak Current (A)	54.4011	$1/\gamma(\mu rad)$	170.333	
Natural Emittance (m.rad)	0.51e-9	$\sigma_x(\mu m)$	91.86	$\sigma_x(\mu rad)$ 6.306
Coupling Constant	0.01	$\sigma_y(\mu m)$	6.154	$\sigma_y(\mu rad)$ 0.8205
$\epsilon_x(m.rad)$ 5.050e-010	$\epsilon_y(m.rad)$ 5.050e-012	$\gamma\sigma_x'$	0.03702	$\gamma\sigma_y'$ 0.0048172



SPECTRA 9.0 - C:\Users\zafer\Desktop\spectra_input\gnu_graflar\kring5.prm

File Select Calculation Run Open Utility Configuration Help

- Energy Dependence
- Spatial Dependence
- K Dependence
- Power@Fixed Point
- Near Field
- Coherent Radiation

Brilliance

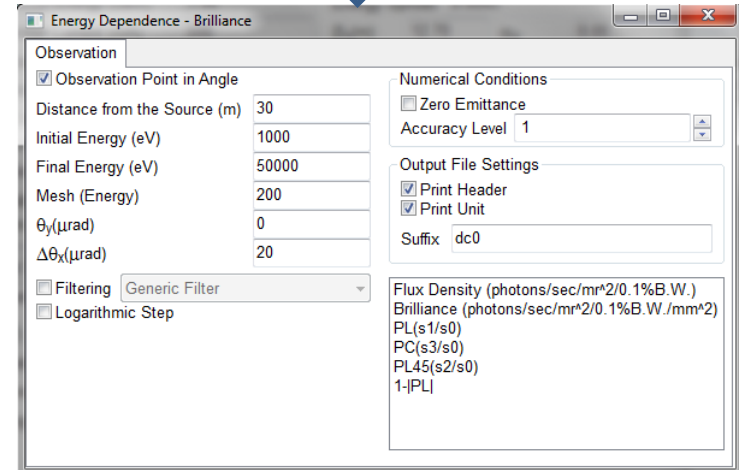
Partial Flux

Characteristics

Align Axis at Center

Energy Spread 0.0005

$\beta_x(m)$	12.70	α_x	0.00
$\beta_y(m)$	7.5	α_y	0.00



Energy Dependence - Brilliance

Observation

Observation Point in Angle

Distance from the Source (m) 30

Initial Energy (eV) 1000

Final Energy (eV) 50000

Mesh (Energy) 200

$\theta_y(\mu rad)$ 0

$\Delta\theta_x(\mu rad)$ 20

Filtering Generic Filter

Logarithmic Step

Numerical Conditions

Zero Emittance

Accuracy Level 1

Output File Settings

Print Header

Print Unit

Suffix dc0

Flux Density (photons/sec/mr²/0.1%B.W.)

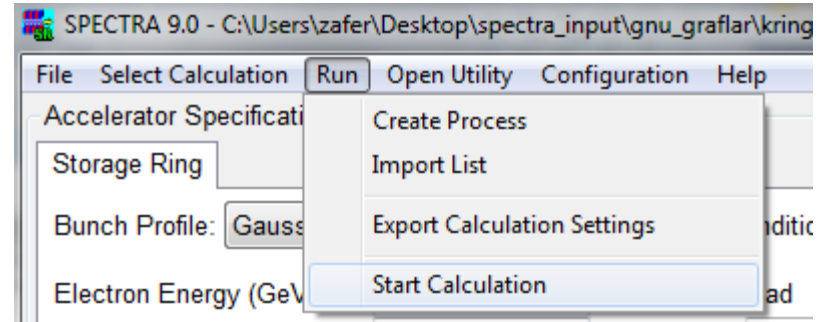
Brilliance (photons/sec/mr²/0.1%B.W./mm²)

PL(s1/s0)

PC(s3/s0)

PL45(s2/s0)

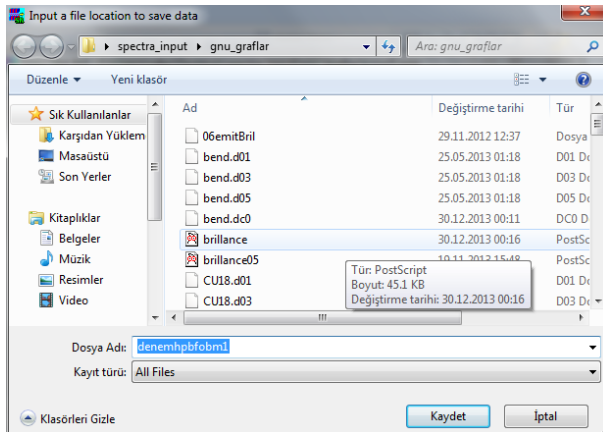
1-|PL|



SPECTRA 9.0 - C:\Users\zafer\Desktop\spectra_input\gnu_graflar\kring5.prm

File Select Calculation Run Open Utility Configuration Help

- Create Process
- Import List
- Export Calculation Settings
- Start Calculation



Input a file location to save data

spectra_input \ gnu_graflar

Ara: gnu_graflar

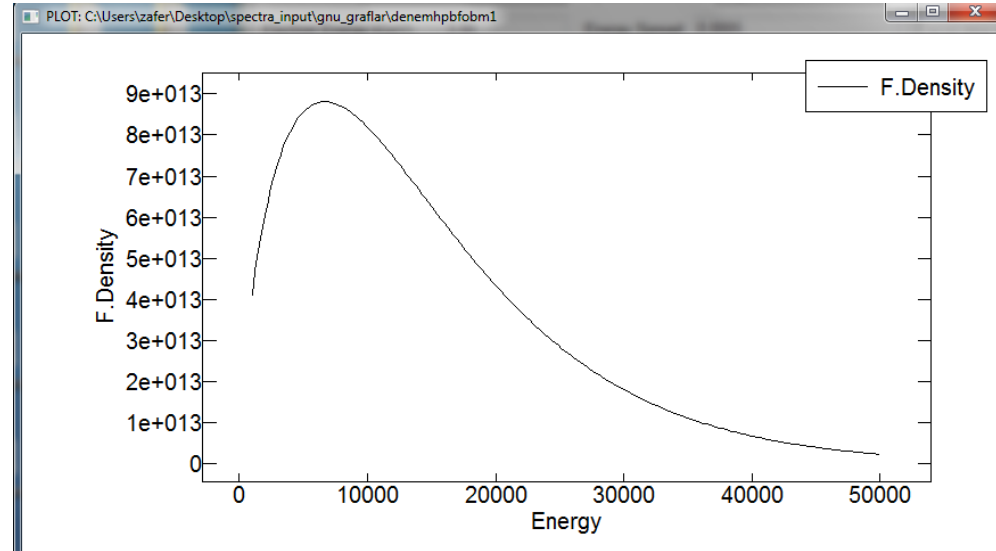
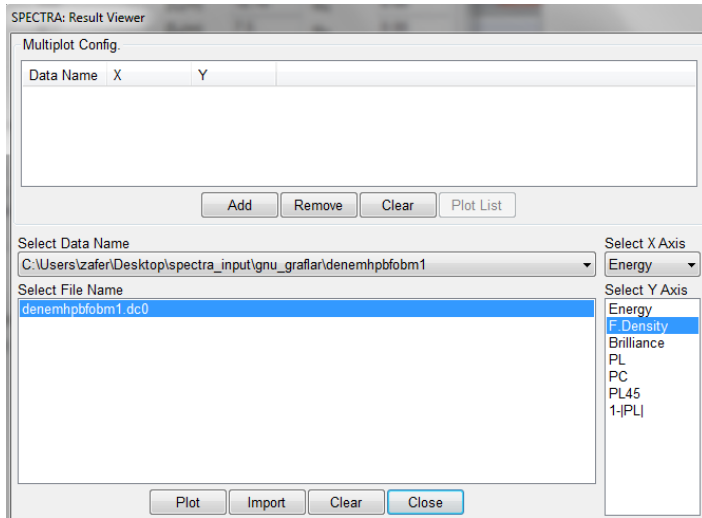
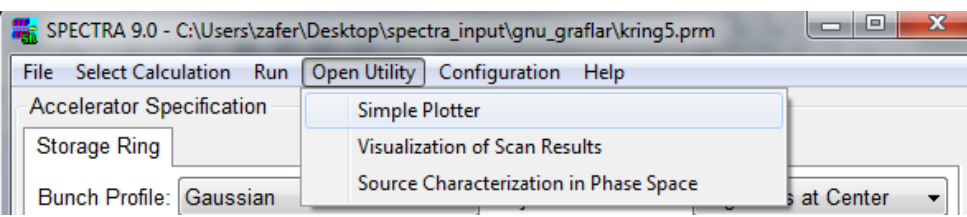
Ad	Değiştirme tarihi	Tür
06emitBril	29.11.2012 12:37	Dosya
bend.d01	25.05.2013 01:18	D01 Dr
bend.d03	25.05.2013 01:18	D03 Dr
bend.d05	25.05.2013 01:18	D05 Dr
bend.d0	30.12.2013 00:11	DC0 D
brillance	30.12.2013 00:16	PostSc
brillance05	30.12.2013 00:16	PostSc
CU18.d01		D01 Dr
CU18.d03		D03 Dr

Dosya Adı: denemhpbfobm1

Kayıt türü: All Files

Kaydet İptal

GRAFİK ÇİZDİRELİM



SPECTRA 8.1 - C:\Program Files (x86)\SPECTRA8.1\prm\lhec\storage_ring.prm

File Select Calculation Run Open Utility Configuration Help

Acc Energy Dependence ▶ Brilliance
 Sto Spatial Dependence ▶ Partial Flux ▶
 Bu K Dependence ▶ Total Flux
 Ele Power@Fixed Point
 Av Near Field ▶
 Cir Coherent Radiation ▶

Bunches 2436
 σ_z (mm) 20
 Peak Current (A) 1.17505
 Natural Emittance (m.rad) 5.9e-9
 Coupling Constant 0.003
 ϵ_x (m.rad) 5.882e-09 ϵ_y (m.rad) 1.765e-11

Energy Spread 0.0011

β_x (m)	24	α_x	0
β_y (m)	5.8	α_y	0
η_x (m)	0	η_x'	0
η_y (m)	0	η_y'	0

$1/\gamma$ (μ rad) 63.8749
 σ_x (μ m) 375.7 σ_x (μ rad) 15.66
 σ_y (μ m) 10.12 σ_y (μ rad) 1.744
 $\gamma\sigma_x'$ 0.2451 $\gamma\sigma_y'$ 0.02731

Light Source Description

Linear Undulator

Link Gap & Field
 Segmented Undulator
 Special Magnet Setup

Gap Value	20	σ_r (μ m)	2.19789	σ_r (μ rad)	3.08254
B(T)	0.26105	Σ_x (μ m)	375.741	Σ_x (μ rad)	15.9562
Periodic Length (cm)	3.2	Σ_y (μ m)	10.353	Σ_y (μ rad)	3.54184
Total Length (m)	4.5	ϵ_{1st} (peak:eV)	14525		
Number of Periods	140	ϵ_{3rd} (peak:eV)	43642.4		
K Value	0.78	Flux _{1st}	4.11454e+14		
ϵ_{1st} (eV)	14562.7	Brilliance _{1st}	4.74079e+19		
		Peak Brilliance	5.57064e+20		
		Bose Degeneracy	0.00014334		
		Total Power (kW)	1.23622		

SPECTRA 8.1 - Untitled

File Select Calculation Run Open Utility Configuration Help

Accelerator Specification

Storage Ring

Bunch Shape: Gaussian Energy Spread 0.0011

Electron Energy (GeV)	8	$\beta_x(m)$	24	α_x	0
Average Current (mA)	100	$\beta_y(m)$	5.8	α_y	0
Circumference	1435	$\eta_x(m)$	0	η_x'	0
Bunches	2436	$\eta_y(m)$	0	η_y'	0
σ_z (mm)	20				
Peak Current (A)	1.17505	$1/\gamma(\mu rad)$			
Natural Emittance (m.rad)	5.9e-9	$\sigma_x(\mu m)$			
Coupling Constant	0.003	$\sigma_y(\mu m)$			
$\epsilon_x(m.rad)$ 5.882e-09	$\epsilon_y(m.rad)$ 1.765e-11	$\gamma\sigma_x'$			

Light Source Description

Linear Undulator

Link Gap & Field
 Segmented Undulator

Gap Value	20	$\sigma_r(\mu m)$	
B(T)	0.26105	$\Sigma_x(\mu m)$	
Periodic Length (cm)	3.2	$\Sigma_y(\mu m)$	
Total Length (m)	4.5	$\epsilon_{1st}(peak)$	
Number of Periods	140	$\epsilon_{3rd}(peak)$	
K Value	0.78	Flux _{1st}	
$\epsilon_{1st}(eV)$	14562.7	Brilliance	
		Peak Bri	
		Bose De	
		Total Po	

spectra [Uyumluluk Modu] - Microsoft PowerPoint

sterisi Gözden Geçir Görünüm

Metin Üstbilgi WordArt Tarih

Energy Dependence - Brilliance

Observation

Observation Point in Angle

Distance from the Source (m) 30

Initial Energy (eV) 10000

Final Energy (eV) 50000

Energy Pitch (eV) 30

$\theta_x(\mu rad)$ 0

$\theta_y(\mu rad)$ 0

$\epsilon_{1st@\theta_{x,y}}(eV)$ 14562.7

Easy Calc. > -1 eV

Auto Pitch: Rel. Difference 0.5

Filtering Generic Filter

Convolution

Numerical Conditions

Zero Emittance
 Zero E-spread

Accuracy Level 1

Output File Settings

Print Header
 Print Unit

Suffix dc0

Flux Density (photons/sec/mr²/0.1%B.W.)
Brilliance (photons/sec/mr²/0.1%B.W.)
PL(s1/s0)
PC(s3/s0)
PL45(s2/s0)
1-|PL|

SPECTRA 8.1 - Untitled

File Select Calculation Run Open Utility Configuration Help

Accelerator Specificati
Storage Ring |
Bunch Shape: Energy Spread 0.0011

Electron Energy (GeV)	8	$\beta_x(m)$	24	α_x	0
Average Current (mA)	100	$\beta_y(m)$	5.8	α_y	0
Circumference	1435	$\eta_x(m)$	0	η_x	0
Bunches	2436	$\eta_y(m)$	0	η_y	0
σ_z (mm)	20				
Peak Current (A)	1.17505	$1/\gamma(\mu rad)$	63.8749		
Natural Emittance (m.rad)	5.9e-9	$\sigma_x(\mu m)$	375.7	$\sigma_x(\mu rad)$	15.66
Coupling Constant	0.003	$\sigma_y(\mu m)$	10.12	$\sigma_y(\mu rad)$	1.744
$\varepsilon_x(m.rad)$ 5.882e-09	$\varepsilon_y(m.rad)$ 1.765e-11	$\gamma\sigma_x$	0.2451	$\gamma\sigma_y$	0.02731

Light Source Description

Linear Undulator |

Link Gap & Field
 Segmented Undulator

Gap Value	20	$\sigma_r(\mu m)$	2.19789	$\sigma_r(\mu rad)$	3.08254
B(T)	0.26105	$\Sigma_x(\mu m)$	375.741	$\Sigma_x(\mu rad)$	15.9562
Periodic Length (cm)	3.2	$\Sigma_y(\mu m)$	10.353	$\Sigma_y(\mu rad)$	3.54184
Total Length (m)	4.5	$\varepsilon_{1st}(peak:eV)$	14525		
Number of Periods	140	$\varepsilon_{3rd}(peak:eV)$	43642.4		
K Value	0.78	Flux _{1st}	4.11454e+14		
$\varepsilon_{1st}(eV)$	14562.7	Brilliance _{1st}	4.74079e+19		
		Peak Brilliance	5.57064e+20		
		Bose Degeneracy	0.00014334		
		Total Power (kW)	1.23622		

Energy Dependence - Brilliance

Observation |

Observation Point in Angle

Distance from the Source (m) 30

Initial Energy (eV) 10000

Final Energy (eV) 50000

Energy Pitch (eV) 30

$\theta_x(\mu rad)$ 0

$\theta_y(\mu rad)$ 0

$\varepsilon_{1st}@\theta_{x,y}(eV)$ 14562.7

Easy Calc. > -1 eV

Auto Pitch: Rel. Difference 0.5

Filtering Generic Filter

Convolution

Numerical Conditions

Zero Emittance
 Zero E-spread

Accuracy Level 1

Output File Settings

Print Header
 Print Unit

Suffix dc0

Flux Density (photons/sec/mr²/0.1%B.V
Brilliance (photons/sec/mr²/0.1%B.V
PL(s1/s0)
PC(s3/s0)
PL45(s2/s0)
1-|PL|

Storage Ring

Bunch Shape:	Gaussian	Energy Spread	0.0011		
Electron Energy (GeV)	8	$\beta_x(m)$	24	α_x	0
Average Current (mA)	100	$\beta_y(m)$	5.8	α_y	0
Circumference	1435	$\eta_x(m)$	0	η_x'	0
Bunches	2436	$\eta_y(m)$	0	η_y'	0
σ_z (mm)	20				
Peak Current (A)	1.17505	$1/\gamma(\mu rad)$	63.8749		
Natural Emittance (m.rad)	5.9e-9	$\sigma_x(\mu m)$	375.7	$\sigma_x(\mu rad)$	15.66
Coupling Constant	0.003	$\sigma_y(\mu m)$	10.12	$\sigma_y(\mu rad)$	1.744
$\epsilon_x(m.rad)$	5.882e-09	$\gamma\sigma_x'$	0.2451	$\gamma\sigma_y'$	0.02731
$\epsilon_y(m.rad)$	1.765e-11				

Light Source Description

Linear Undulator

Link Gap & Field

Segmented Undulator

Gap Value	20	$\sigma_r(\mu m)$	2.19
B(T)	0.26105	$\Sigma_x(\mu m)$	375
Periodic Length (cm)	3.2	$\Sigma_y(\mu m)$	10.3
Total Length (m)	4.5	$\epsilon_{1st}(peak:eV)$	
Number of Periods	140	$\epsilon_{3rd}(peak:eV)$	
K Value	0.78	Flux _{1st}	
$\epsilon_{1st}(eV)$	14562.7	Brilliance _{1st}	
		Peak Brilliance	
		Bose Degener	
		Total Power (k	

Energy Dependence - Brilliance

Observation

Observation Point in Angle

Numerical Conditions

SPECTRA: Result Viewer

Select Data Name

C:\Program Files\SPECTRA8.1\deneme1

Select File Name

deneme1.dc0

Select X Axis

Energy

Select Y Axis

Energy

F.Density

Brilliance

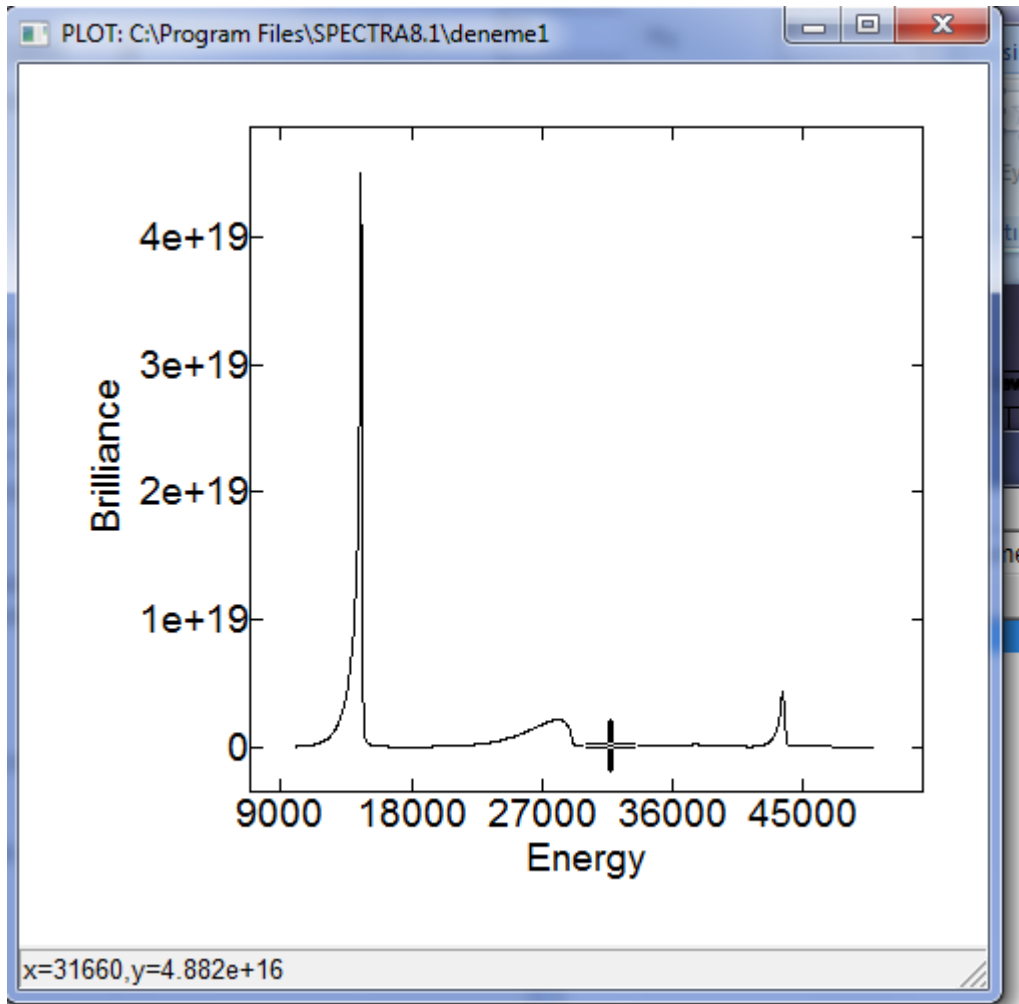
PL

PC

PL45

1-|PL|

Plot Import Clear Close



Windows Explorer window showing the file structure:

Address bar: ZaferNergiz > AppData > Local > VirtualStore > Program Files > SPECTRA8.1

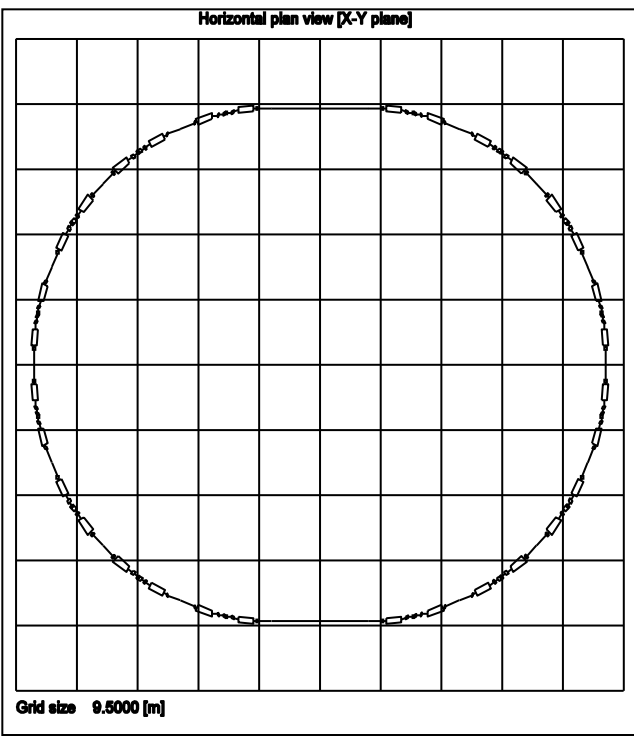
Search: Ara: SPECTRA8.1

Menu: Düzenle, Aç, Bununla paylaş, Yaz, Yeni klasör

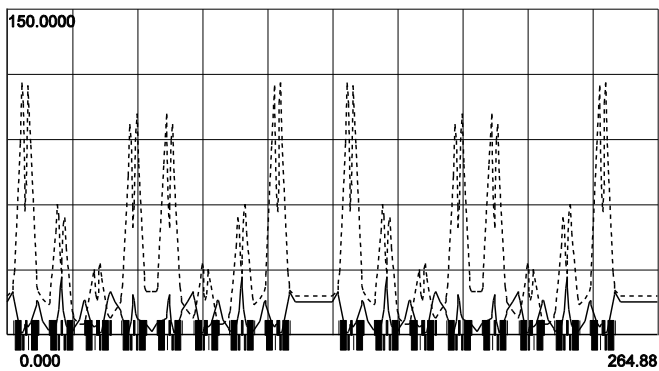
Ad	Değiştirme tarihi	Tür	Boyut
deneme1.dc0	23.01.2012 11:41	DC0 Dosyası	129 KB
deneme1.dc0.dc0	23.01.2012 11:37	DC0 Dosyası	129 KB
undu1out.dc0	23.01.2012 09:32	DC0 Dosyası	129 KB

undu1out.dc0 - Not Defteri

Dosya	Düzen	Biçim	Görünüm	Yardım		
EB(GeV)	EMITTANCEX	EMITTANCEY	SIZEx(m)	SIZEy(m)	DIVx(rad)	DIVy(rad)
3.000e+00	5.882e-09	1.765e-11	3.757e-04	1.012e-05	1.566e-05	1.744e-06
betax	alphax	betay	alphy	eta	deta	E_spread
2.400e+01	0.000e+00	5.800e+00	0.000e+00	0.000e+00	0.000e+00	1.100e-03
Ibeam(A)	period(cm)	#periods	Kx	Ky		
1.000e-01	3.200e+00	140	0.000e+00	7.800e-01		
thetax(rad)	thetay(rad)					
0.000e+00	0.000e+00					
Energy	F.Density	Brilliance	PL	PC	PL45	1- PL
eV	ph/s/mr^2/0.1%	F.Dens/mm^2	-	-	-	-
1.00000e+04	1.984e+13	8.036e+14	9.954295e-01	0.000000e+00	6.902171e-17	4.570466e-03
1.00300e+04	1.349e+13	5.465e+14	9.916808e-01	0.000000e+00	2.546893e-17	8.319232e-03
1.00600e+04	2.339e+13	9.473e+14	9.941051e-01	0.000000e+00	-4.728363e-17	5.894853e-03
1.00900e+04	6.996e+13	2.834e+15	9.976240e-01	0.000000e+00	-4.298187e-17	2.375973e-03
1.01200e+04	1.947e+14	7.890e+15	9.990007e-01	0.000000e+00	-2.717482e-17	9.993031e-04
1.01500e+04	4.926e+14	1.996e+16	9.995593e-01	0.000000e+00	-1.573422e-17	4.407085e-04
1.01800e+04	1.250e+15	5.064e+16	9.998242e-01	0.000000e+00	-7.684800e-18	1.758462e-04
1.01950e+04	1.972e+15	7.993e+16	9.998962e-01	0.000000e+00	-4.895000e-18	1.038309e-04
1.02100e+04	2.831e+15	1.147e+17	9.999390e-01	0.000000e+00	-3.048319e-18	6.103822e-05
1.02400e+04	2.983e+15	1.209e+17	9.999750e-01	0.000000e+00	-1.330638e-18	2.496299e-05
1.02550e+04	1.934e+15	7.840e+16	9.999817e-01	0.000000e+00	-9.807409e-19	1.825542e-05
1.02700e+04	9.025e+14	3.658e+16	9.999847e-01	0.000000e+00	-8.056118e-19	1.531065e-05
1.03000e+04	9.927e+13	4.024e+15	9.999747e-01	0.000000e+00	-1.088370e-18	2.526388e-05
1.03300e+04	7.730e+13	9.039e+14	9.999432e-01	0.000000e+00	-2.071514e-18	5.675423e-05



Betatron amplitude functions [m] versus distance [m]



Dispersion functions [m] versus distance [m]



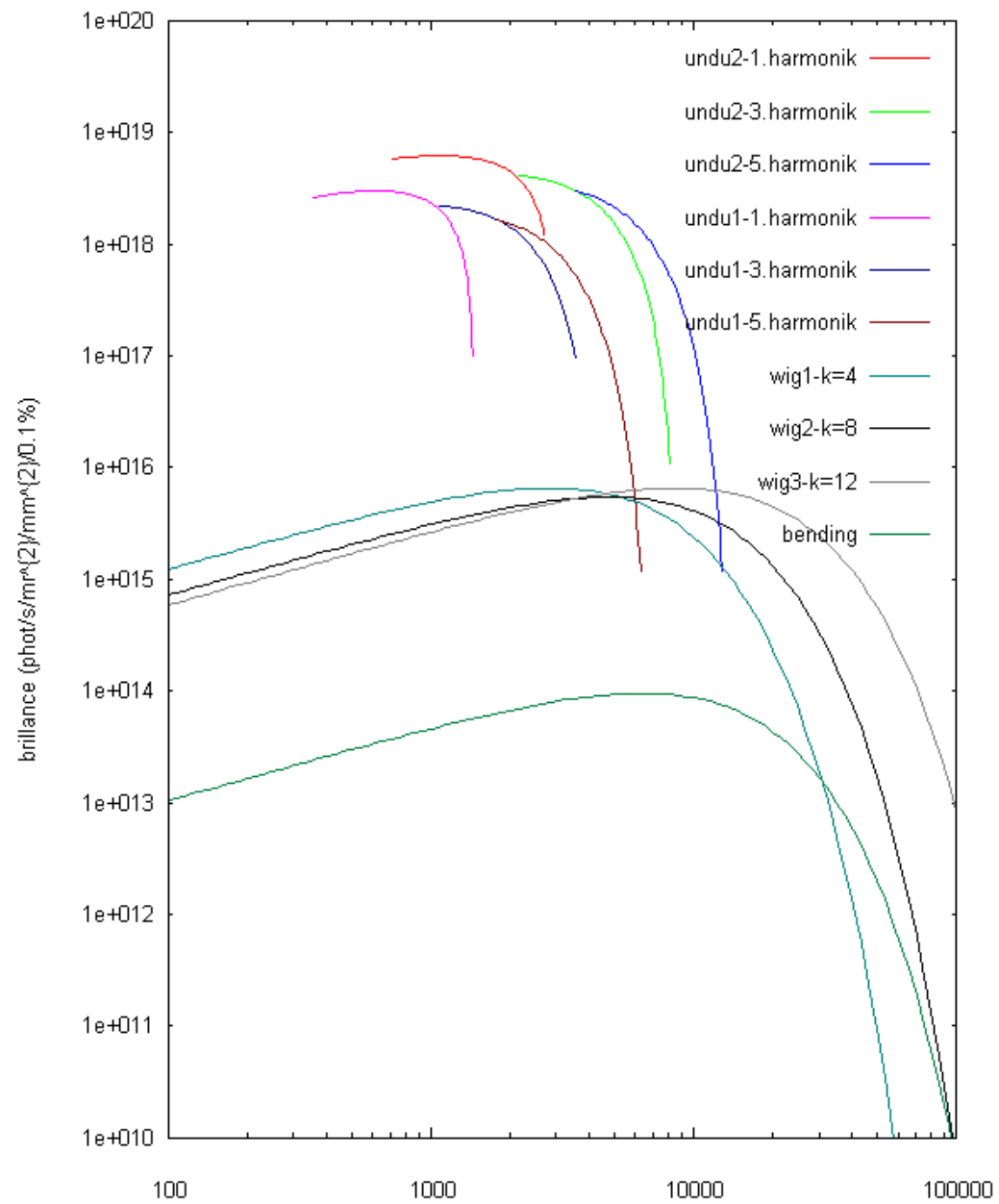
Elektron demeti parametreleri

Enerji (GeV)	3.56
I_{ortalama} (mA)	400
Emittans (nm rad)	8
Betax/Betay (m)	2.5/2.5
D_x/D_y	0.22

Işınım kaynağı parametreleri

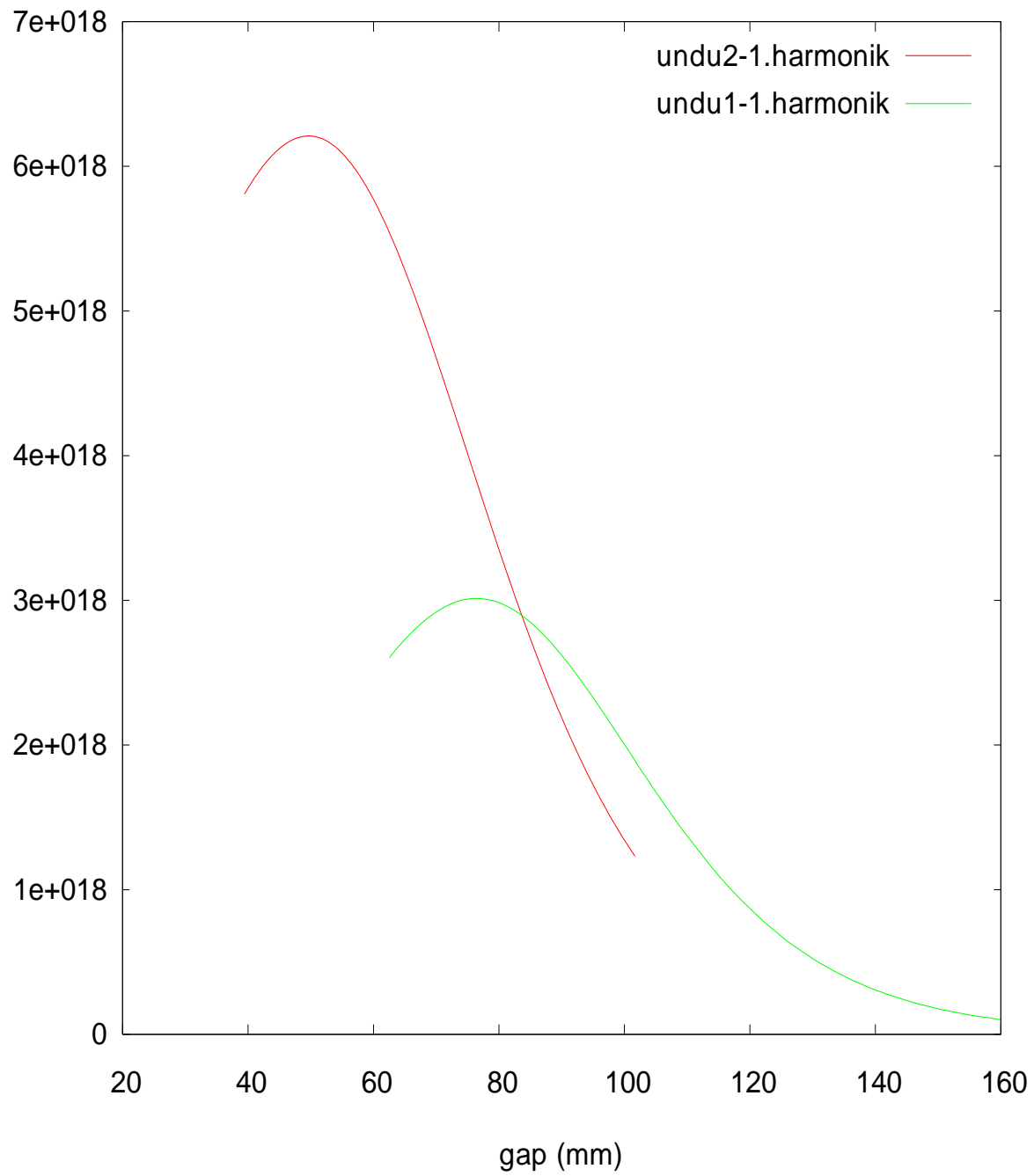
Işınım kaynağı	Wiggler1	Undulator1	Undulator2
Periyot uzunluğu (cm)	10	8	4
Periyot sayısı	35	45	75
Manyetik alan (T)	0.42	0.16	0.32
K değeri	4	1.2	1.2

Wiggler2 için K=8 ve wigler3 için K=12



3047.39, 2.63665e+020

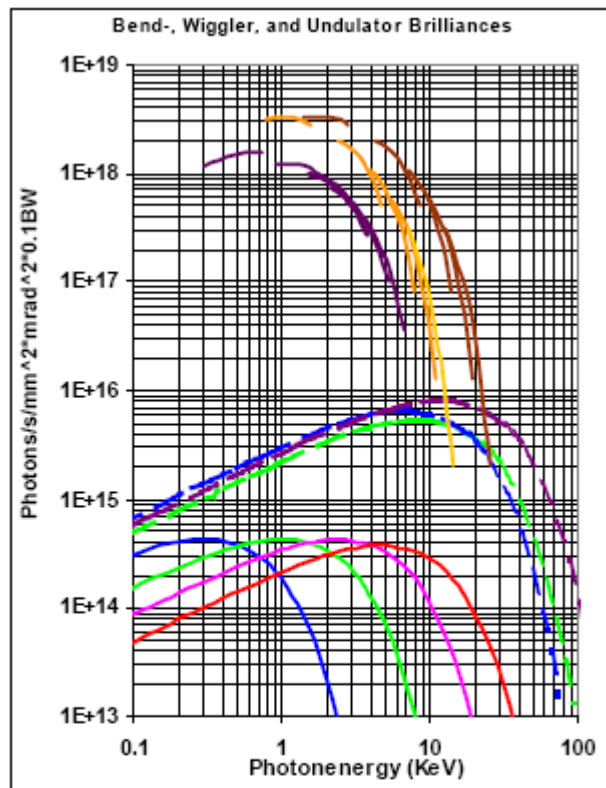
Enerji (eV)



	$E_{1,\text{pik}}$ (eV)	$E_{3,\text{pik}}$ (eV)	Brilliance _{1,pik}	Flux _{1,pik} Foton/s/%1 BW	Total Power (kW)
Undulator1	836	2525	$2.6 \cdot 10^{18}$	$8 \cdot 10^{14}$	0.29
Undulator2	1679	5029	$5.5 \cdot 10^{18}$	$1.4 \cdot 10^{15}$	0.96



	E_c (eV)	Total Power (kW)
Wigler1	3489	2.0
Wigler1	5816	5.5
Wigler1	10469	18.0



- | | | |
|-----------|------------|-------|
| — 1.0 GeV | - - - W120 | — U40 |
| — 1.5 GeV | - - - W100 | — U25 |
| — 2.0 GeV | - - - W60 | — U14 |
| — 2.5 GeV | | |

UYGULAMA

Table 4.2: SESAME storage ring parameters (without insertion devices).

Parameter	Unit	Value
General Parameters		
Energy	GeV	2.5
Maximum Beam current	mA	400
Circumference	m	124.802
Natural emittance	nm.rad	24.9
Coupling	%	1
Horizontal emittance	nm.rad	24.65
Vertical emittance	nm.rad	0.2465
Horizontal tune		7.217
Vertical tune		5.192
Relative energy spread	%	0.1119
Chromaticity (horizontal)		-13.1
Chromaticity (vertical)		-13.8
Machine Functions		
Horizontal beta functions		
Wiggler / bending / undulator	m/rad	11.12 / 0.483 / 10.9
Vertical beta functions		
Wiggler / bending / undulator	m/rad	1.89 / 18.75 / 1.73
Dispersion function		
Wiggler / bending / undulator	m	0.453 / 0.135 / 0.534
Beam Sizes and Cross Sections		
Horizontal beam size		
Wiggler / bending / undulator	μm	728.6 / 186.3 / 790.9
Vertical beam size		
Wiggler / bending / undulator	μm	21.6 / 68 / 20.6
Beam area		
Wiggler / bending / undulator	mm^2	0.099 / 0.0796 / 0.102
R.F.-System (2nd stage)		
Energy loss per turn	keV	580
R.F.-power	kW	413
Cavity Shunt impedance	$\text{M}\Omega$	3.4
R.F.-cavity voltage	kV	487

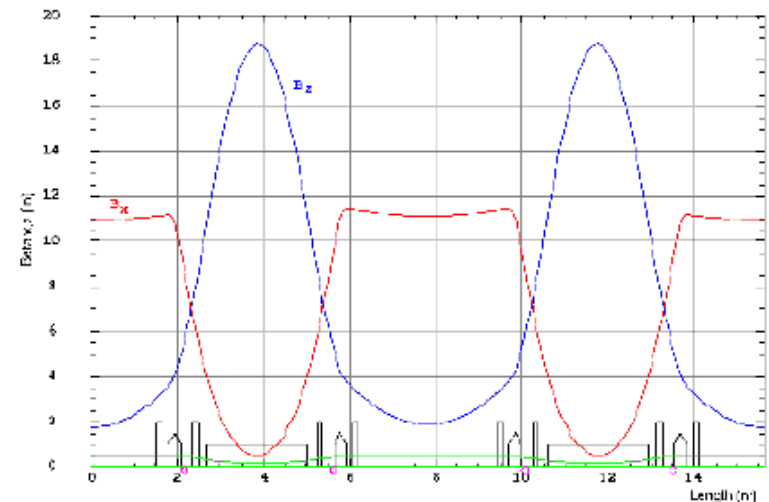


Figure 4.2: Optical functions of SESAME lattice, the green line represents dispersion. The pink circles represent BPMs.

•Uygulama1. SESAME’de Eğici magnetlerden elde edilen ışınımın parlaklık spektrumunu 1.5, 2.0, 2.5 GeV elektron enerjileri için bulalım.

Eğici magnetin eğrilik yarıçapı: 5.9565 m

uzunluğu : 2.34 m

2.5 GeV’de B : 1.4 T

$$B(T)\rho(m) = E(\text{GeV})/0.2998$$

Uygulama 2. SESAME'de zigzaglayıcılardan elde edilen ışınımın parlaklık spektrumunu çizdiriniz.

Table 2.1: Data's of the wigglers foreseen at SESAME.

Type	B_0	λ_w	N_w	L	K	X_0	X'
W-100	2.0 T	100 mm	24	2.4 m	18.7	0.061 mm	3.8 mrad
W-120	2.5 T	120 mm	20	2.4 m	28.0	0.109 mm	5.7 mrad
W-60	3.5 T	60 mm	30	1.8 m	19.6	0.038 mm	4.0 mrad

Uygulama 3. SESAME'de aşağıda parametreleri verilen salındırıcılarından elde edilecek ışınımın Parlaklık spektrumlarını çizdiriniz.

$\lambda = 14$ mm, $k = 1-2$, $L = 1.4$ m, coupling = %2

$\lambda = 11$ mm, $k = 1.4-2.8$, $L = 2.4$ m, coupling = %2

Kaynaklar

- *Takasha TANAKA Cheiron 2011: Light Source I*
- Sarah Cousineau, Jeff Holmes, Yan Zhang, USPAS, January, 2011
- SESAME web sitesi, Yellow Book