

[sirepo.com/zgoubi](https://sirepo.com/zgoubi)

Paul Moeller


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# [sirepo.com/zgoubi](https://sirepo.com/zgoubi)


- FODO example
  - Lattice
  - Bunch
  - Twiss
  - Visualization
- Copy and Sharing
- Export
- Import zgoubi.dat
- Compare with other codes (elegant and synergia)


# FODO example


 ZGOUBI


Simulations


 New Simulation


 New Folder


 Import


 ?





 /


 Examples

 View as List

 Examples

 SATURNE 3 Ge V  
Synchrotron 2

 Simple FODO


 Import a zgoubi.dat  
datafile

# FODO example: Lattice

ZGOUBI Simulations Simple FODO

... Lattice ⚡ Bunch ... Twiss Visualization ⚙️ 🔍 🖨️

### Lattice - BL1



Twiss Parameters

### Beamline Editor - BL1

drag and drop elements here to define the beamline

F O D O

### Beamlines

Name	Description	Length	Bend
BL1	(F,O,D,O)	20.00m	0.0°

### Beamline Elements

Name	Description	Length	Bend
DRIFT			
O		8.000m	
QUADRUPO			
D	B_0=-0.07142857142	2.000m	0.0°
F	B_0=0.07142857142	2.000m	0.0°

Create BL1 beamline.

8m Drift

2m Quads with

$B_0: 0.07142857142$

and

$B_0: -0.07142857142$

# FODO example: Lattice

The screenshot shows the QUADRUPO software interface. At the top, there is a light blue header bar with the text "QUADRUPO" on the left and a help icon (?) and close icon (x) on the right. Below the header, the main content area is titled "Quadrupole magnet". Under this title, there are two tabs: "Main" (which is selected) and "Fringe Fields". The "Main" tab contains several input fields for configuring the quadrupole magnet. The fields are: "Name" (with a text box containing "D"), "Length [m]" (with a text box containing "2"), "Radius at Pole Tip [m]" (with a text box containing "0.1"), "Field at Pole Tip [kG]" (with a text box containing "-0.07142857142"), "Integration Step [m]" (with a text box containing "0.02"), "Alignment" (with a dropdown menu showing "Element Aligned"), "Longitudinal Shift [m]" (with a text box containing "0"), "Transverse Shift [m]" (with a text box containing "0"), and "Z-axis Rotation [rad]" (with a text box containing "0"). At the bottom of the form, there is a checkbox labeled "Save Step-by-Step Coordinates and Fields" which is currently unchecked, and a button labeled "No". Below this, there are two buttons: "Save Changes" (in blue) and "Cancel" (in white).

QUADRUPO

Quadrupole magnet

Main Fringe Fields

Name

Length [m]

Radius at Pole Tip [m]

Field at Pole Tip [kG]

Integration Step [m]

Alignment

Longitudinal Shift [m]

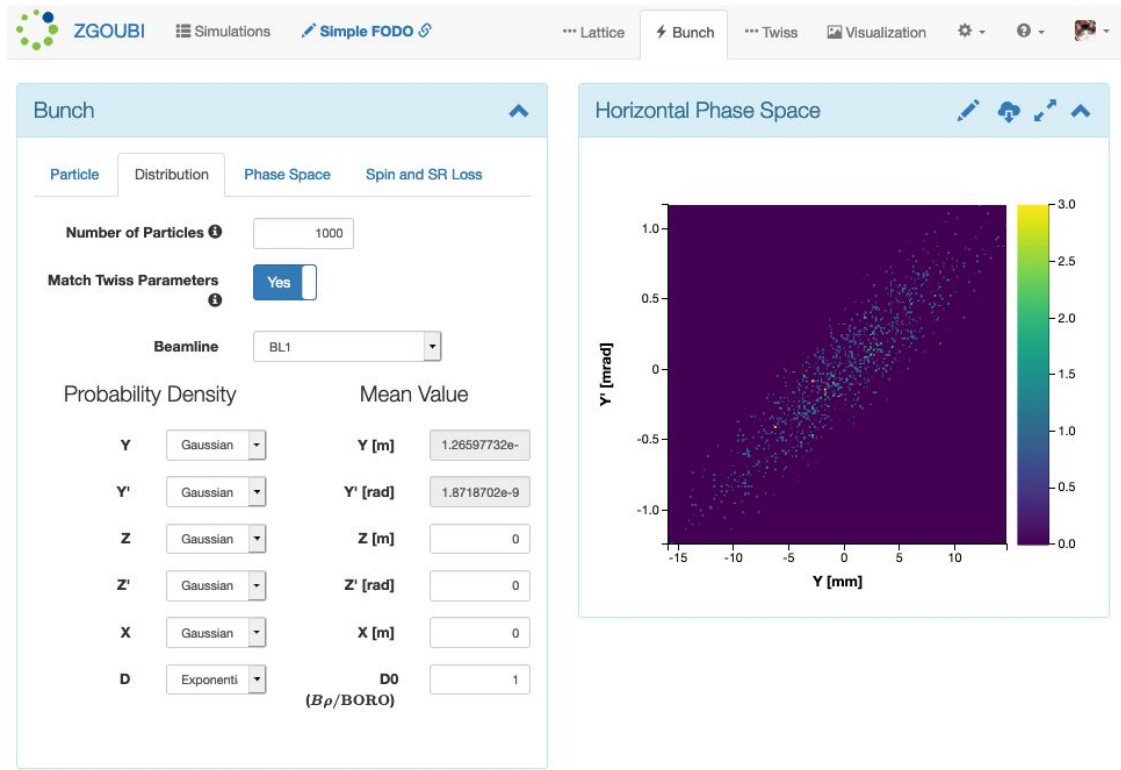
Transverse Shift [m]

Z-axis Rotation [rad]

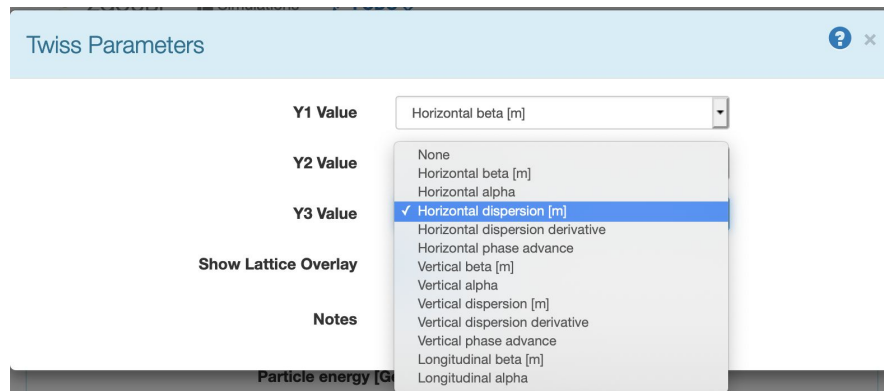
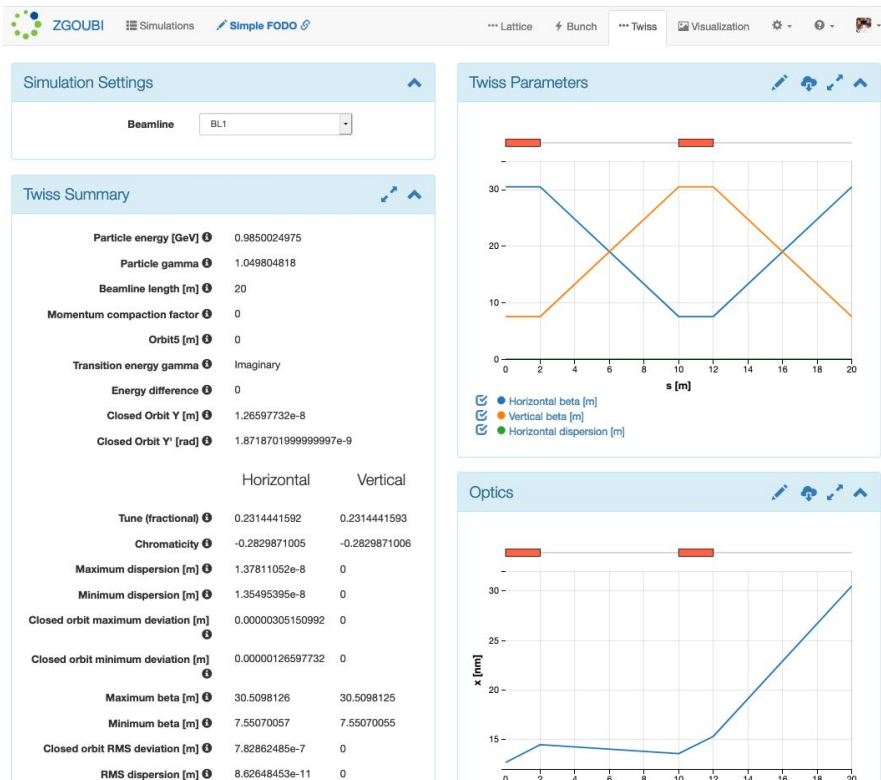
Save Step-by-Step Coordinates and Fields ☐ No

Save Changes Cancel

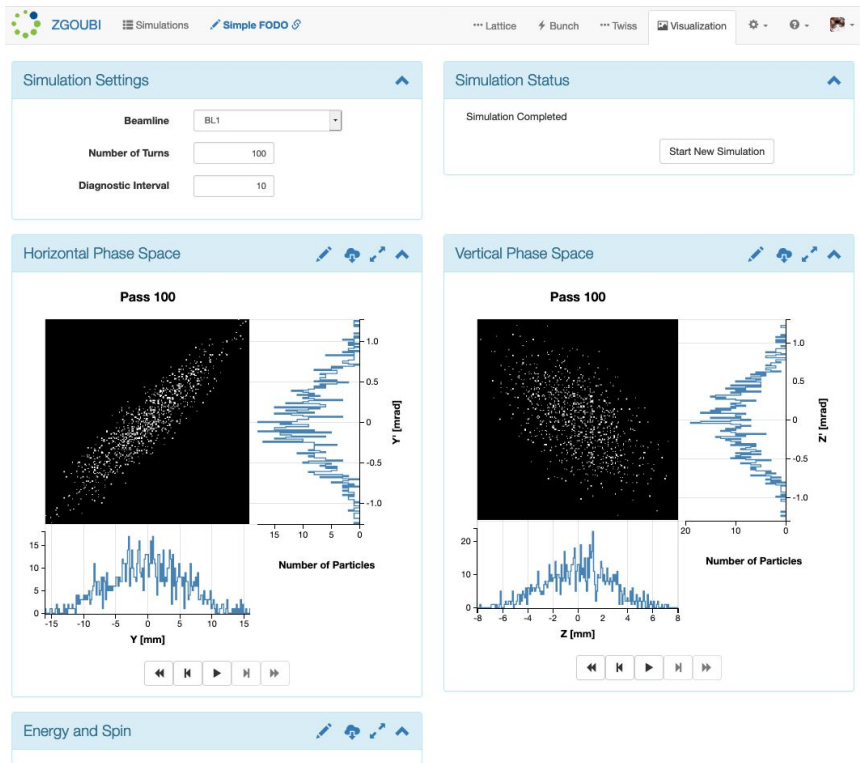
# FODO example: Bunch



# FODO Example: Twiss

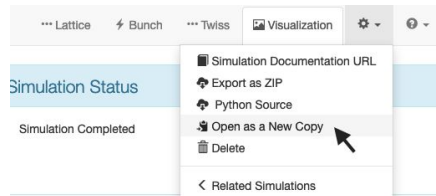


# FODO Example: Visualization





# Copy and Modify a Simulation



A screenshot of the 'Bunch' configuration panel. It has four tabs: 'Particle', 'Distribution' (selected), 'Phase Space', and 'Spin and SR Loss'. The 'Distribution' tab contains the following settings:

- Number of Particles**: 1000
- Match Twiss Parameters**: No
- Probability Density** and **Mean Value** table:

	Probability Density	Mean Value
Y	Gaussian	Y [m] 1.26597732e-8
Y'	Gaussian	Y' [rad] 1.8718702e-9
Z	Gaussian	Z [m] 0
Z'	Gaussian	Z' [rad] 0
X	Gaussian	X [m] 0
D	Exponential	D0 (Bρ/BORO) 1

A screenshot of the 'QUADRUPO' configuration panel. It has two tabs: 'Main' and 'Fringe Fields'. The 'Main' tab contains the following settings:

- Name**: F1
- Length [m]**: 2
- Radius at Pole Tip [m]**: 0.1
- Field at Pole Tip [kG]**: 0.058
- Integration Step [m]**: 0.02
- Alignment**: Element Misaligned
- Longitudinal Shift [m]**: 0
- Transverse Shift [m]**: 0
- Z-axis Rotation [rad]**: 0
- Save Step-by-Step Coordinates and Fields**: No

Buttons at the bottom: 'Save Changes' and 'Cancel'.

Turn off bunch/twiss matching and introduce an error to the F quad field, B\_0: 0.058

# Copy and Modify a Simulation

Simulation Settings

Beamline: BL1

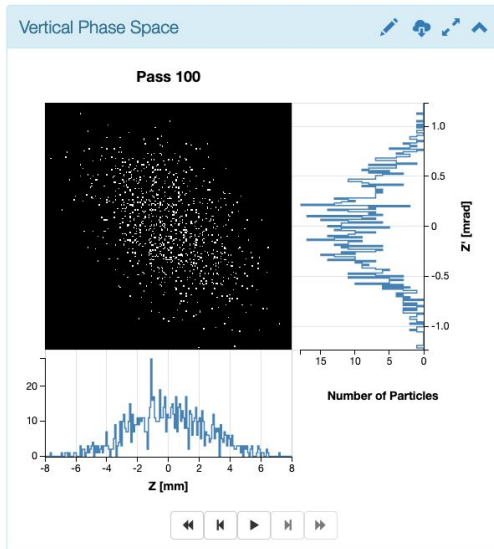
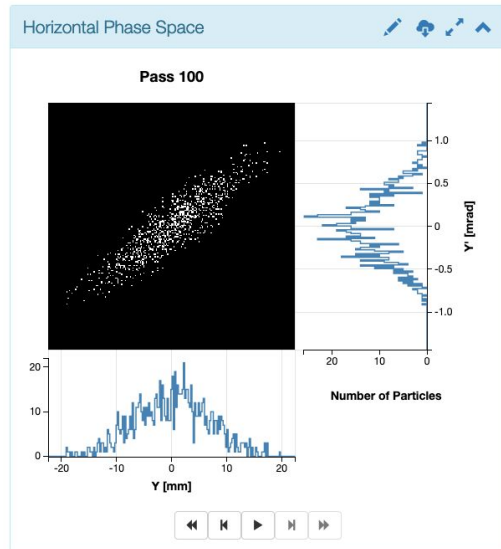
Number of Turns: 100

Diagnostic Interval: 10

Simulation Status

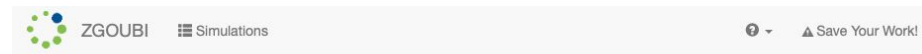
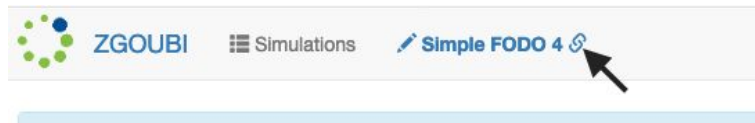
Simulation Completed

Start New Simulation



Run the simulation and observe how the bunch's horizontal phase space is no longer uniform across turns.

# Sharing a Simulation



## Reproduce Simulation?

The URL you provided refers to a simulation for a different session.

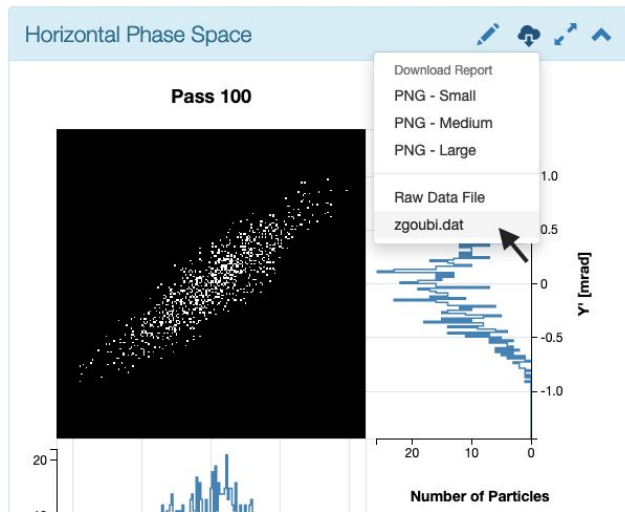
Would you like to **Copy** the simulation into your existing session?

Copy Simulation

Cancel

<https://beta.sirepo.com/zgoubi#/lattice/z2KgcrJ4>

# Export zgoubi.dat



```
[py2;@v3 zz]$ zgoubi
```

Zgoubi, author's dvlpmnt version.  
Job started on 27-08-2019, at 21:49:03  
Copying zgoubi.dat into zgoubi.res,  
numbering and labeling elements...

Title :

1/ 10 OPTIONS / /

Zgoubi, author's dvlpmnt version.  
Job started on 27-08-2019, at 21:49:03  
JOB ENDED ON 27-08-2019, AT 21:49:10

CPU time, total : 6.040100999999999

```
[py2;@v3 zz]$ gnuplot
```

GNUPLOT

Version 5.0 patchlevel 6 last modified 2017-03-18

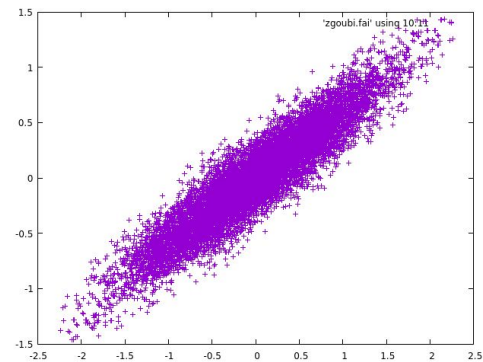
Copyright (C) 1986-1993, 1998, 2004, 2007-2017  
Thomas Williams, Colin Kelley and many others

gnuplot home: <http://www.gnuplot.info>  
faq, bugs, etc: type "help FAQ"  
immediate help: type "help" (plot window: hit 'h')

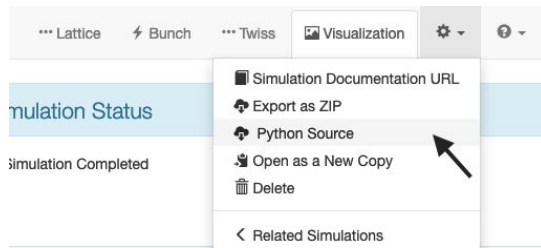
Terminal type set to 'qt'

```
gnuplot> plot 'zgoubi.fai' using 10:11
```

```
plot 'zgoubi.fai' using 10:11
```



# Export pyzgoubi



```
1 # Simple FODO 4
2
3 from zgoubi import core, utils
4 import re
5
6 def sext(*args, **kwargs):
7     return core.FAKE_ELEM(re.sub('QUADRUPO', 'SEXTUPOL', core.QUADRUPO(*args, **kwargs).output()))
8
9 core.SEXTUPOL = sext
10
11 line = core.Line('line')
12
13 line.add(core.FAKE_ELEM("""
14 'OPTIONS'
15 1 1
16 WRITE OFF
17 """))
18 line.add(core.FAKE_ELEM("""
19 'MCOBJET'
20 1000
21 3
22 1000
23 2 2 2 2 2
24 1.26597732e-08 1.8718702e-09 0 0 0 1
25 -2.2014181 30.509813 1e-06 3 1.3593498e-08 -2.3450892e-11
26 0.66847085 7.5507006 1e-06 3 0 0
27 0 1 1e-06 3 0
28 123456 234567 345678
29 """))
30 line.add(core.FAKE_ELEM("""
31 'PARTICUL'
32 PROTON
33 """))
34
35
36 line.add(core.QUADRUPO("F", CS_5=0, X_E=0.0, CS_3=0, CS_2=0, CS_1=0, CS_0=0, R_0=10.0, CS_4=0,
37 X_S=0.0, C_1=0, C_0=0, C_3=0, C_2=0, C_5=0, C_4=0, B_0=0.058, KPOS=2, XPAS=2.0, IL=0, ALE=0,
38 YCE=0.0, XCE=0.0, LAM_E=0.0, XL=200.0, LAM_S=0.0))
39 line.add(core.DRIFT("O", XL=800.0))
40 line.add(core.QUADRUPO("D", CS_5=0, X_E=0.0, CS_3=0, CS_2=0, CS_1=0, CS_0=0, R_0=10.0, CS_4=0,
41 X_S=0.0, C_1=0, C_0=0, C_3=0, C_2=0, C_5=0, C_4=0, B_0=-0.07142857142, KPOS=1, XPAS=2.0, IL=0,
42 ALE=0, YCE=0.0, XCE=0.0, LAM_E=0.0, XL=200.0, LAM_S=0.0))
43 line.add(core.DRIFT("O", XL=800.0))
44 line.add(core.FAKE_ELEM("""
45 'FAISTORE'
46 zgoubi.fai
47 10
48 """))
49 line.add(core.REBELOTE(K=99, NPASS=99))
50 line.add(core.END())
51
52 with open('zgoubi.dat', 'w') as f:
53     f.write(line.output())
```

# Import zgoubi.dat

ZGOUBI Simulations

+ New Simulation + New Folder Import

View as List

Examples Import

Simple FODO Simple FODO 2 Simple FODO 3 Simple FODO 4

Import a zgoubi.dat datafile

Name	Date Modified	Size
saturne-Xing7-Nuz.res	Today at 3:57 PM	2.4 MB

ZGOUBI Simulations SATURNE. CROSSING GammaG=7-Nuz, Nuz=3.60877(perturbed), 2.1 T/s, 1.40487 keV/Turn

Lattice Bunch Twiss Visualization

Simulation Settings

Beamline BL1

Number of Turns 3501

Diagnostic Interval 1

Simulation Status

Simulation Completed

Start New Simulation

Horizontal Phase Space

Vertical Phase Space

Tunes

3D Spin

All Frames, Particle 3

Particle 3

# Import zgoubi.dat, unsupported elements

New Beamline Element

Basic Advanced All Elements

AUTOREF	BEND	CAVITE	CHANGREF	CHANGREF2	DRIFT
FFA	FFA_SPI	MARKER	MULTIPOL	QUADRUPO	SCALING
SEXTUPOL	SOLENOID	SPINR	TOSCA	YMY	

Close

Let us know which element you need, email  
[support@radiasoft.net](mailto:support@radiasoft.net)

ZGOUBI Simulations Microsonde + EBqpole 2 Lattice Bunch Twiss Visualization

Unsupported Zgoubi elements: EBMULT, HISTO

Lattice - BL1

Beamlines

Name	Description	Length	Bend
BL1	(DR,DR2,DUMMY EBMULT	5.889m	0.0°

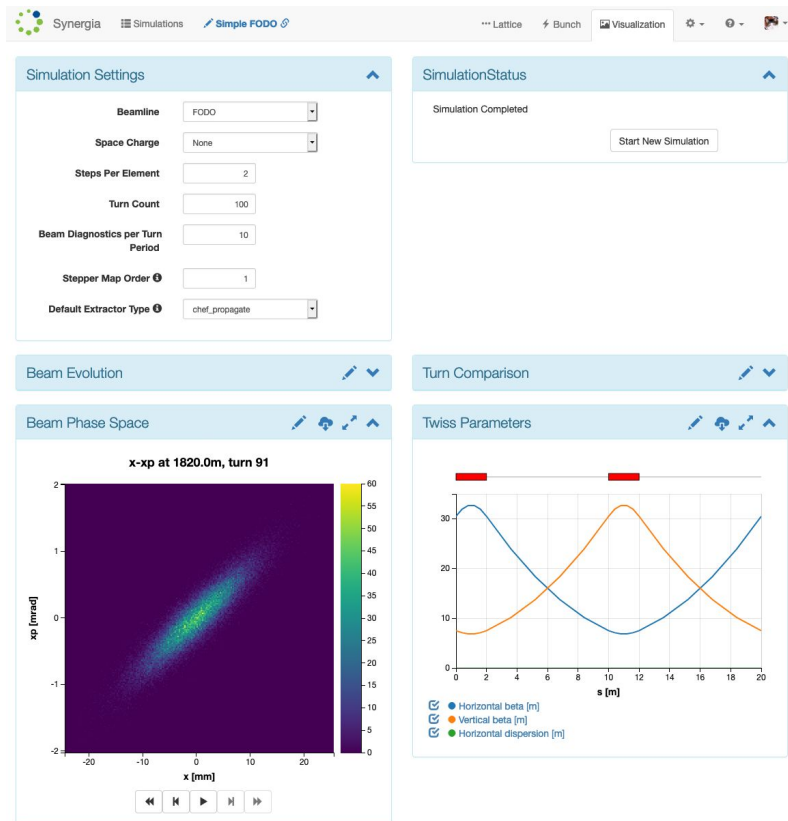
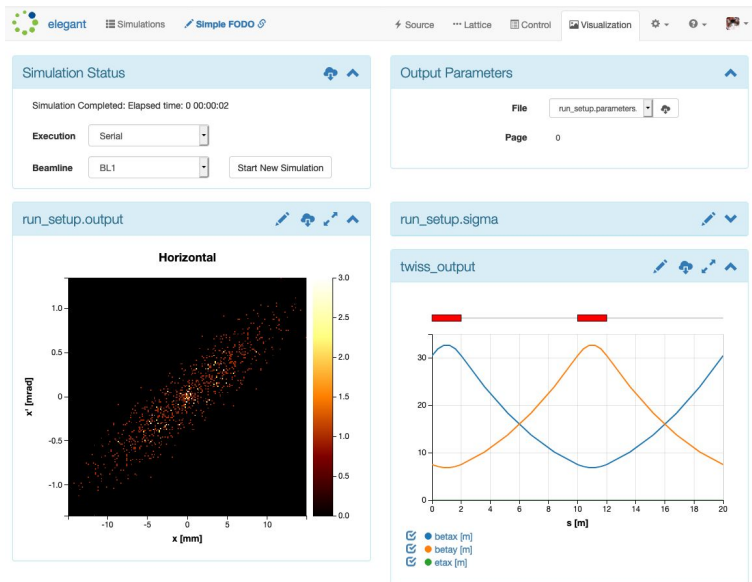
Beamline Elements

Name	Description	Length	Bend
DRIFT			
DR		5.000m	
DR2		590.0mm	
DR3		49.00mm	
DR4		250.0mm	
DUMMY EBMULT		0	
DUMMY HISTO		0	

# Compare with other codes (elegant and synergia)

<https://beta.sirepo.com/elegant#/visualization/UFs5jg3k>

<https://beta.sirepo.com/synergia#/visualization/DSN6sJH7>





# Please give us feedback

Let us know your comments and suggestions.

[support@radiasoft.net](mailto:support@radiasoft.net)