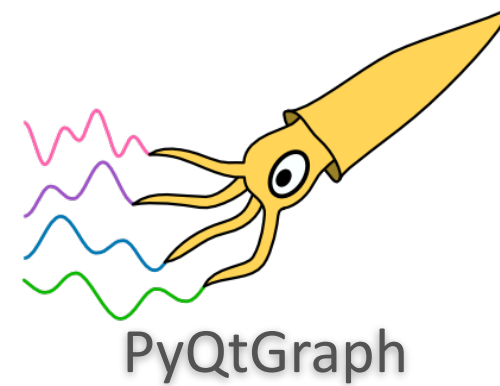


PSI Center for Scientific Computing,
Theory and Data

BEC Widgets

Flexible GUI Framework

Jan Wyzula
PSI, 24 July 2024



Full compatibility for other Qt based components

Fast visualisation with PyQtGraph



BEC WIDGETS

CLI / Scripting

Flexible

Control Panels

Data Visualisation

 **BEC WIDGETS**

CLI / Scripting

Flexible

Control Panels

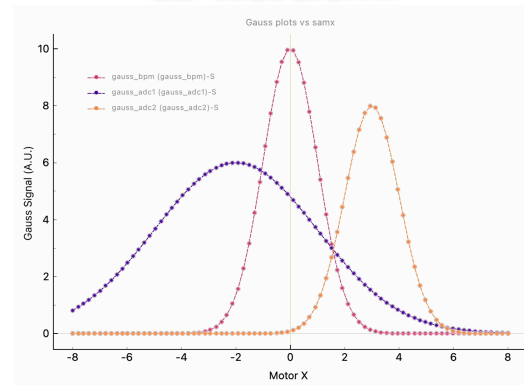
Data Visualisation

 **BEC WIDGETS**

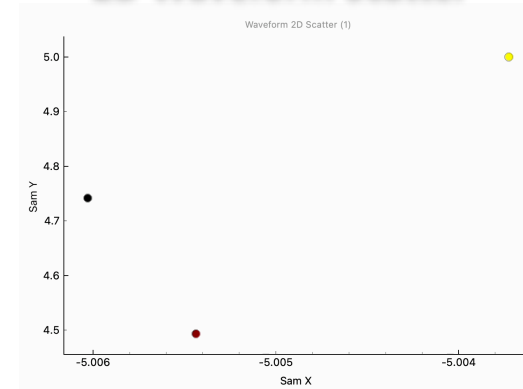
Data Visualisation



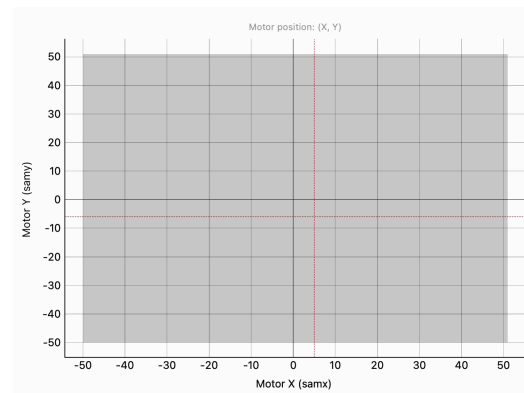
1D Waveform



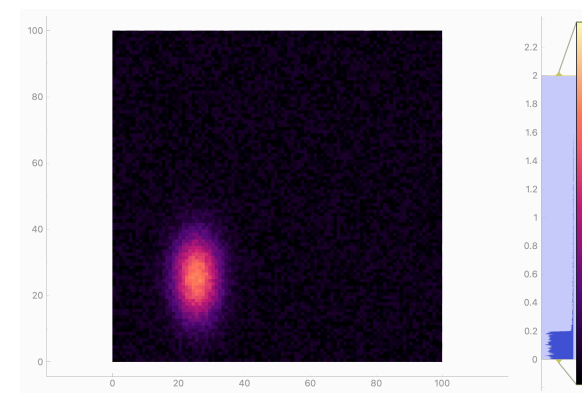
2D Waveform Scatter



Motor Map



2D Live View



Command Line

GUI Interaction

 **BEC WIDGETS**

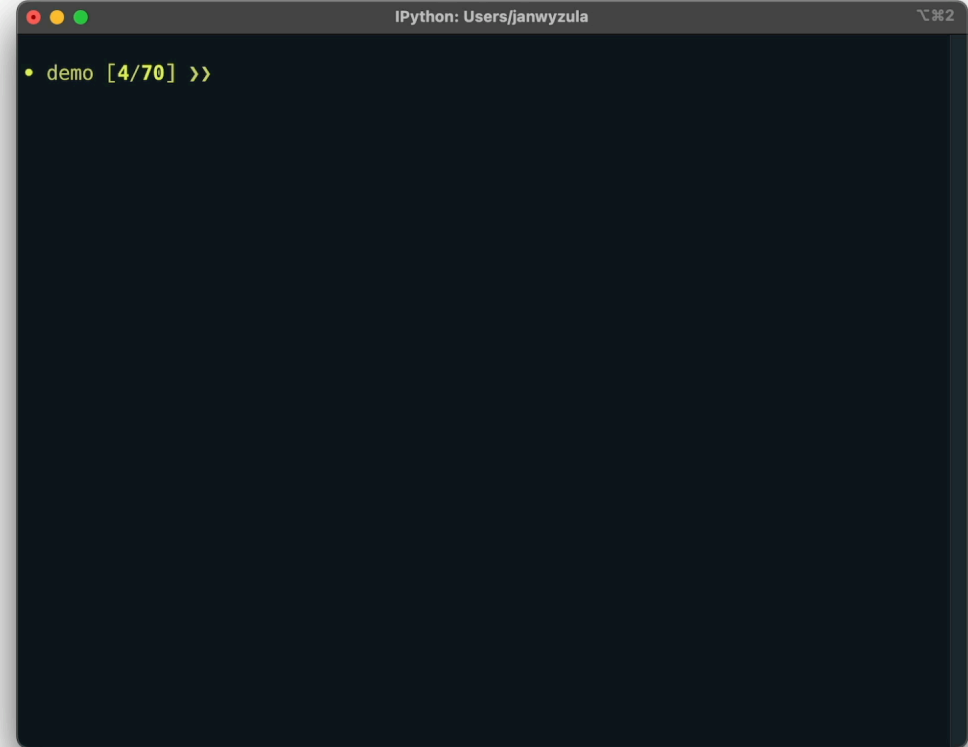
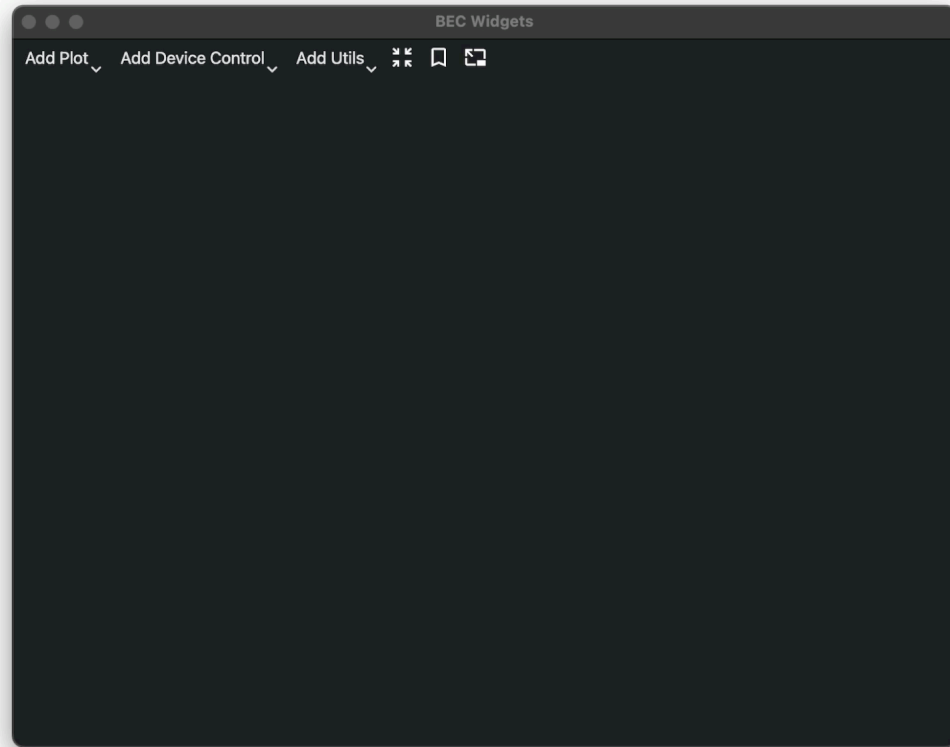
Command Line

GUI Interaction

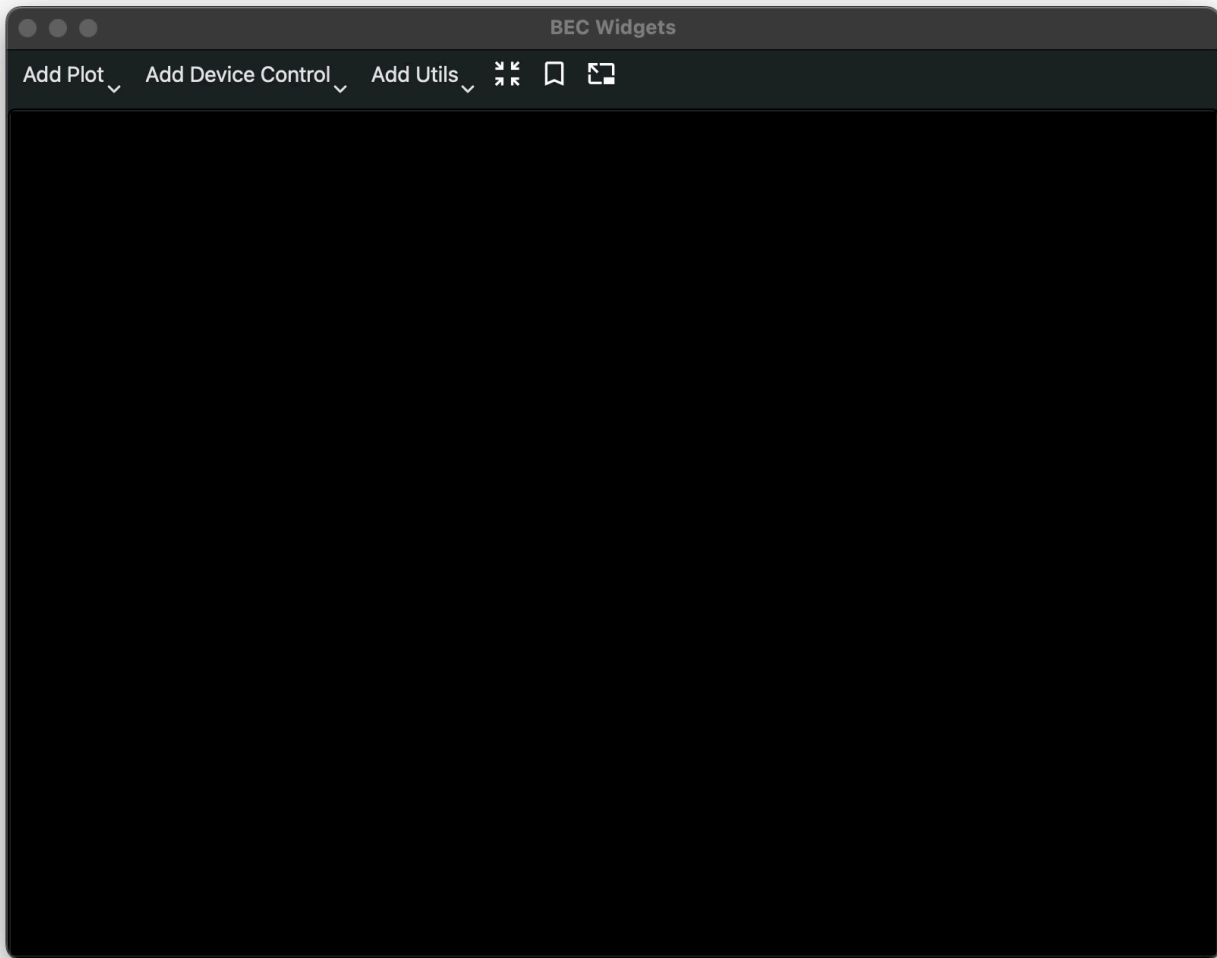


BEC WIDGETS

Command Line

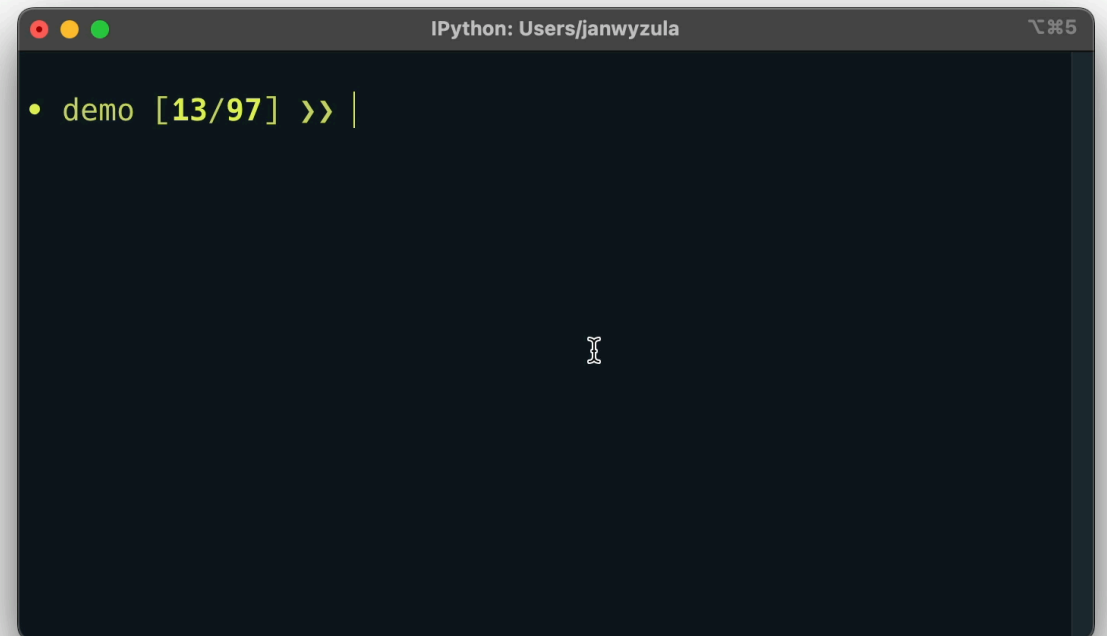


Event Scripting



Example:

- Line Scan → Waveform
- Grid Scan → 2D Image



Command Line

GUI Interaction

 **BEC WIDGETS**

Command Line

GUI Interaction



BEC WIDGETS

Control Panels



Motor X: Motor Y:

Motor position: (-0.01, 0.01)

Scan Selection

Scan Arguments

Device	Start	Stop	Steps
<input type="text"/>	0.00	0.00	0
<input type="text"/>	0.00	0.00	0

Scan Parameters

Exp Time	Settling Time	Burst At Each Point	Relative
0.01	0.00	1	<input type="checkbox"/>

samx

samy

samz

Control Panels



Motor X: Motor Y:

Motor position: (-0.01, 0.01)

Scan Selection

Scan Arguments

Device	Start	Stop	Steps
<input type="text"/>	0.00	0.00	0
<input type="text"/>	0.00	0.00	0

Scan Parameters

Exp Time	Settling Time	Burst At Each Point	Relative
0.01	0.00	1	<input type="checkbox"/>

Individual motor controls

samx

samy

samz

Control Panels



Motor X: samx Motor Y: samy

Motor position: (-0.01, 0.01)

Motor Y (samy)

Motor X (samx)

Scan parameters

Scan Selection

grid_scan

Start Stop

Add Bundle Remove Bundle

Scan Arguments

Device	Start	Stop	Steps
	0.00	0.00	0
	0.00	0.00	0

Scan Parameters

Exp Time	Settling Time	Burst At Each Point	Relative
0.01	0.00	1	<input type="checkbox"/>

Individual motor controls

samx

-0.012

0

2.000

Stop

samy

0.015

0

5.000

Stop

samz

-0.002

0.000

0.010

Stop

Control Panels



Visualisation of motor x-y position

Motor X: Motor Y:

Motor position: (-0.01, 0.01)

Scan parameters

Scan Selection

grid_scan

Scan Arguments

Device	Start	Stop	Steps
<input type="text"/>	0.00	0.00	0
<input type="text"/>	0.00	0.00	0

Scan Parameters

Exp Time	Settling Time	Burst At Each Point	Relative
0.01	0.00	1	<input type="checkbox"/>

Individual motor controls

samx

samy

samz

Control Panels



Motor X: Motor Y:

Motor position: (-0.01, 0.01)

Scan Selection

Scan Arguments

Device	Start	Stop	Steps
<input type="text"/>	0.00	0.00	0
<input type="text"/>	0.00	0.00	0

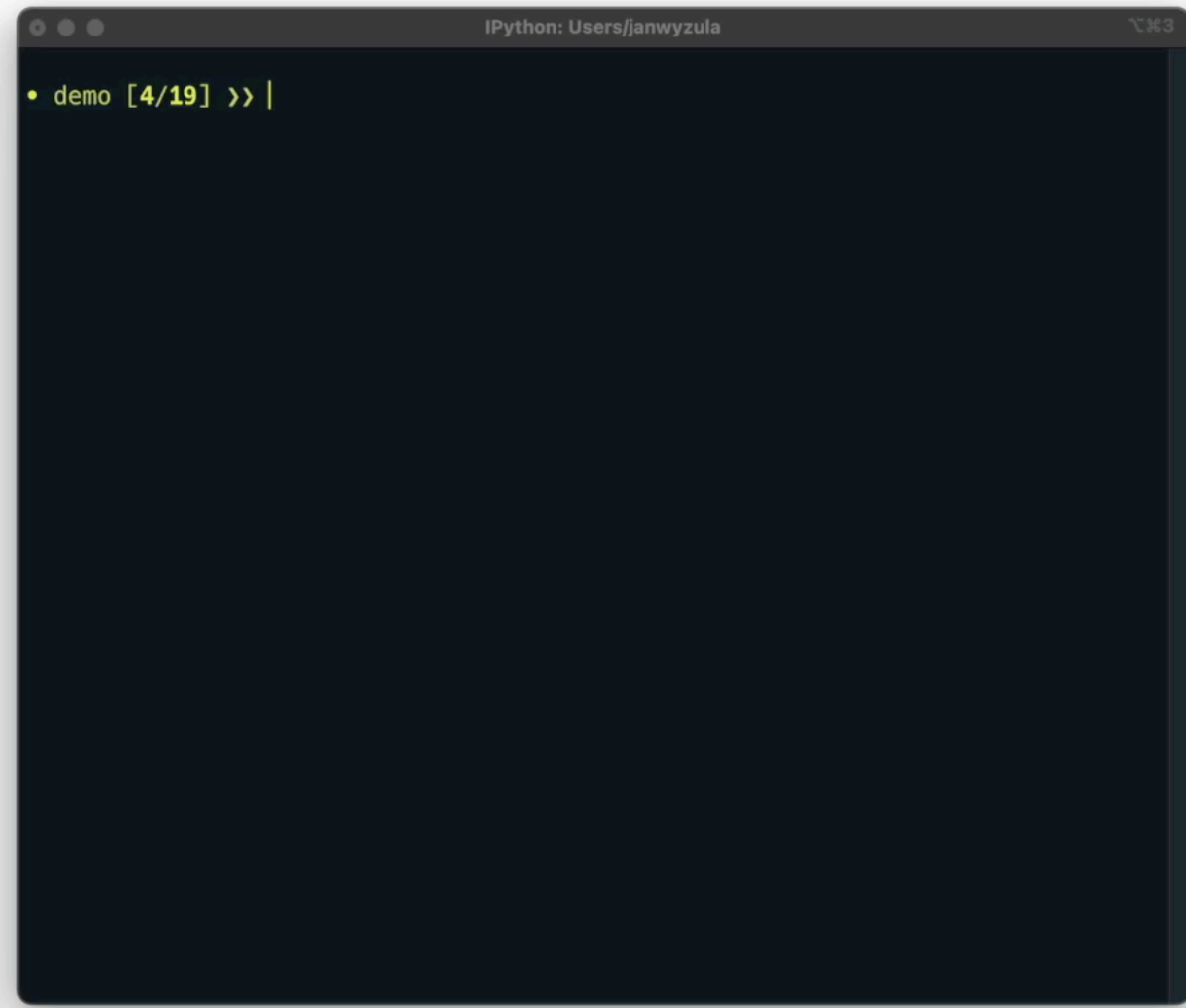
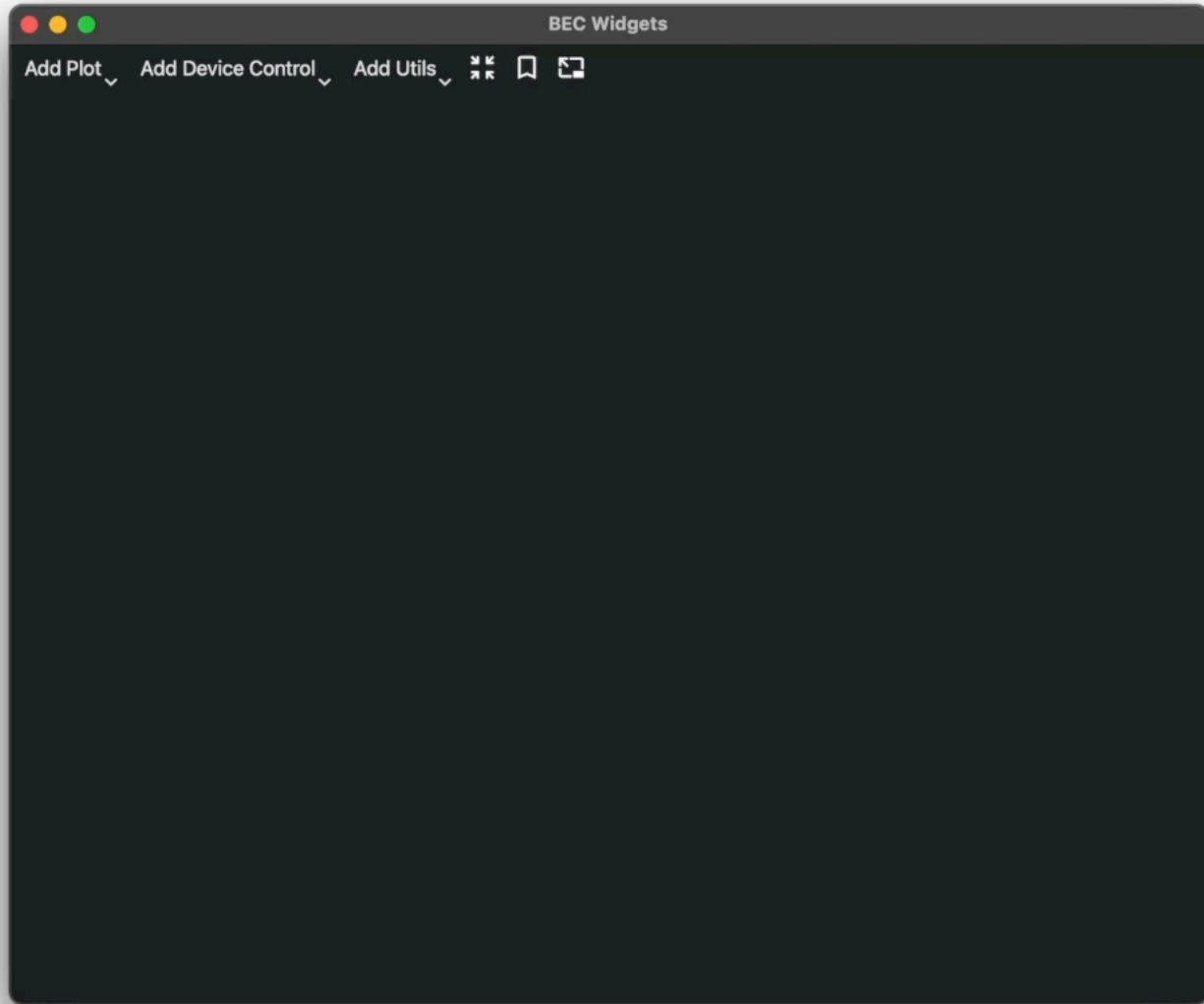
Scan Parameters

Exp Time	Settling Time	Burst At Each Point	Relative
0.01	0.00	1	<input type="checkbox"/>

samx

samy

samz



Additional Widgets

Feedback from last GUI BSEG (January)

Additional Widgets

Feedback from last GUI BSEG (January)

Bash Console

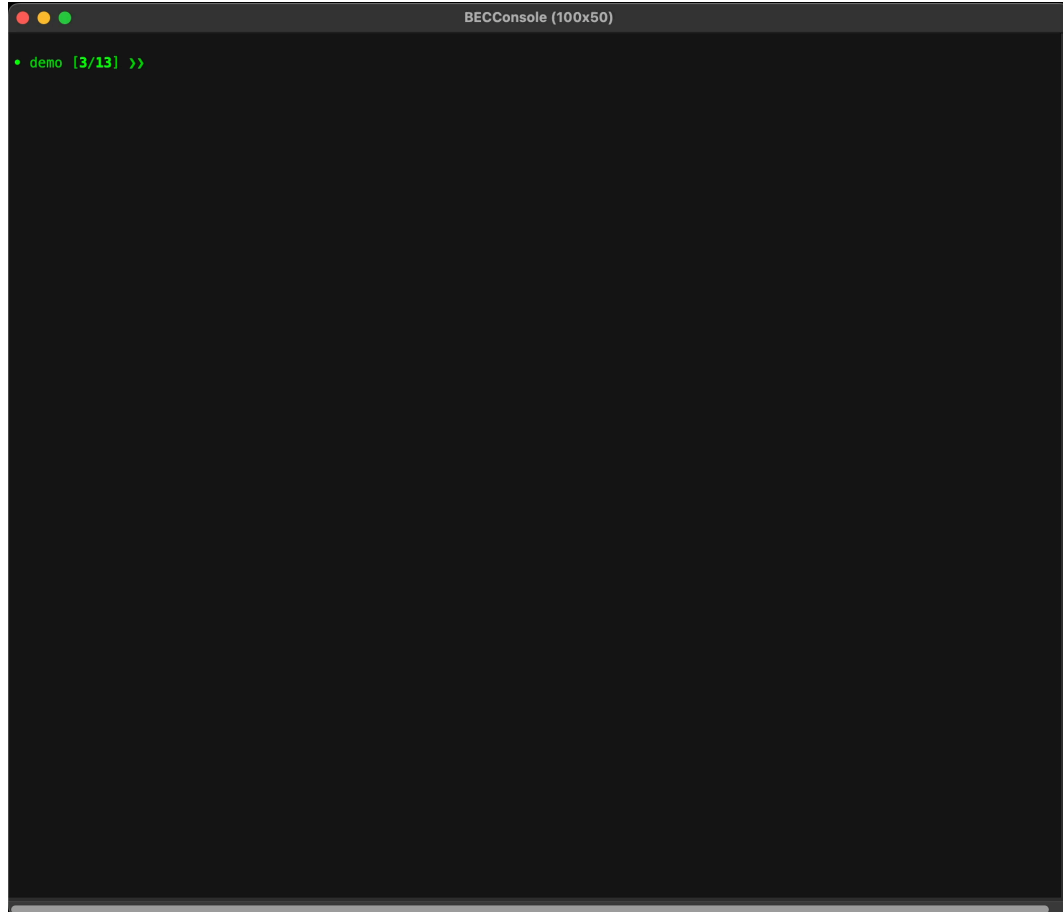
Code Editor

Additional Widgets



Bash Console

Code Editor



Additional Widgets



Bash Console

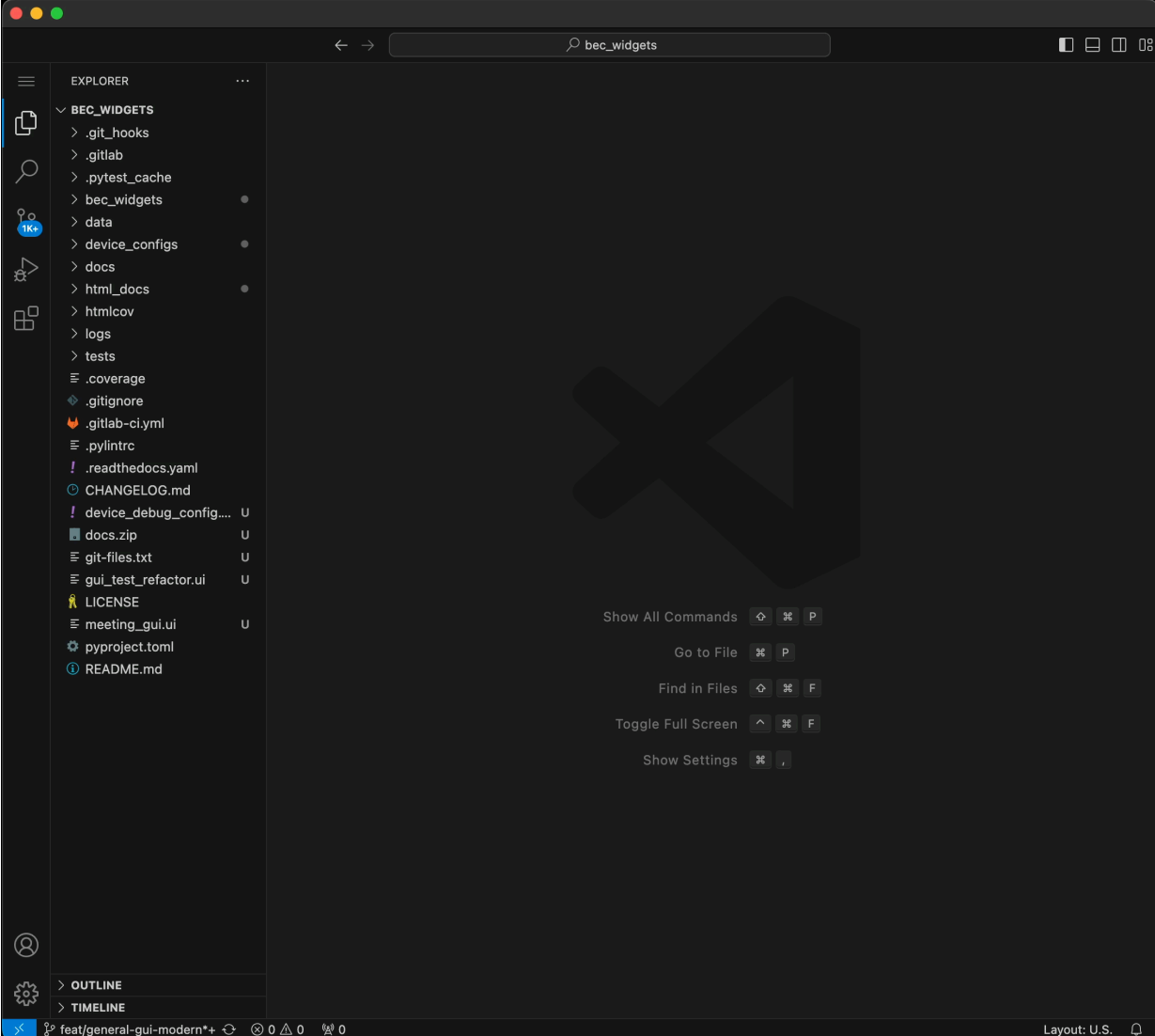
```
BECConsole (100x50)
 71 | 4.138 | 2.079 | 104 | 101 | 106 | 101 | 95 | 106 | 106 | 97 |
 72 | 4.346 | 2.178 | 92 | 110 | 95 | 90 | 94 | 107 | 94 | 97 |
 73 | 4.543 | 2.277 | 109 | 109 | 103 | 93 | 91 | 101 | 103 | 90 |
 74 | 4.755 | 2.373 | 94 | 106 | 102 | 91 | 102 | 106 | 92 | 105 |
 75 | 4.950 | 2.467 | 105 | 90 | 94 | 92 | 102 | 109 | 98 | 109 |
 76 | 5.153 | 2.575 | 101 | 93 | 101 | 104 | 91 | 108 | 91 | 99 |
 77 | 5.353 | 2.678 | 107 | 103 | 107 | 92 | 108 | 97 | 108 | 102 |
 78 | 5.560 | 2.781 | 110 | 93 | 106 | 105 | 103 | 108 | 106 | 99 |
 79 | 5.764 | 2.887 | 94 | 99 | 96 | 109 | 104 | 96 | 107 | 110 |
 80 | 5.955 | 2.975 | 104 | 91 | 94 | 93 | 107 | 109 | 91 | 94 |
 81 | 6.167 | 3.081 | 104 | 105 | 105 | 107 | 102 | 91 | 110 | 94 |
 82 | 6.373 | 3.188 | 98 | 107 | 101 | 99 | 101 | 107 | 95 | 106 |
 83 | 6.566 | 3.292 | 94 | 110 | 98 | 97 | 95 | 106 | 106 | 104 |
 84 | 6.764 | 3.376 | 94 | 102 | 98 | 102 | 97 | 91 | 110 | 91 |
 85 | 6.974 | 3.480 | 97 | 109 | 108 | 101 | 110 | 99 | 99 | 104 |
 86 | 7.180 | 3.591 | 90 | 104 | 108 | 109 | 105 | 98 | 108 | 101 |
 87 | 7.382 | 3.696 | 104 | 105 | 95 | 96 | 99 | 92 | 102 | 106 |
 88 | 7.566 | 3.781 | 106 | 107 | 101 | 93 | 98 | 105 | 94 | 108 |
 89 | 7.777 | 3.885 | 109 | 99 | 92 | 97 | 104 | 93 | 105 |
 90 | 7.984 | 3.991 | 93 | 99 | 107 | 95 | 91 | 96 | 104 | 105 |
 91 | 8.190 | 4.081 | 103 | 101 | 96 | 90 | 107 | 98 | 106 | 103 |
 92 | 8.375 | 4.183 | 94 | 106 | 96 | 98 | 107 | 90 | 106 | 97 |
 93 | 8.579 | 4.295 | 105 | 97 | 96 | 97 | 110 | 105 | 102 | 103 |
 94 | 8.786 | 4.386 | 99 | 92 | 104 | 95 | 108 | 110 | 107 | 107 |
 95 | 8.999 | 4.486 | 95 | 107 | 94 | 98 | 91 | 108 | 104 | 107 |
 96 | 9.191 | 4.590 | 109 | 90 | 95 | 105 | 109 | 106 | 92 | 107 |
 97 | 9.387 | 4.701 | 106 | 101 | 106 | 104 | 110 | 101 | 90 | 95 |
 98 | 9.592 | 4.791 | 110 | 106 | 104 | 92 | 90 | 108 | 101 | 91 |
 99 | 9.794 | 4.898 | 101 | 101 | 103 | 90 | 95 | 106 | 107 | 92 |

-----
|seq_num| samx | samy | bpm5a | bpm3y | bpm6a | bpm3x | bpm3i | bpm5x | bpm5b | ebpmidy |
-----
| 100 | 10.007 | 4.995 | 90 | 101 | 106 | 108 | 103 | 102 | 109 | 99 |
-----
| Scan 13 finished. Scan ID cfcee722-4f45-4538-ae55-f48f65980478. Elapsed time: 2.91 s |
-----

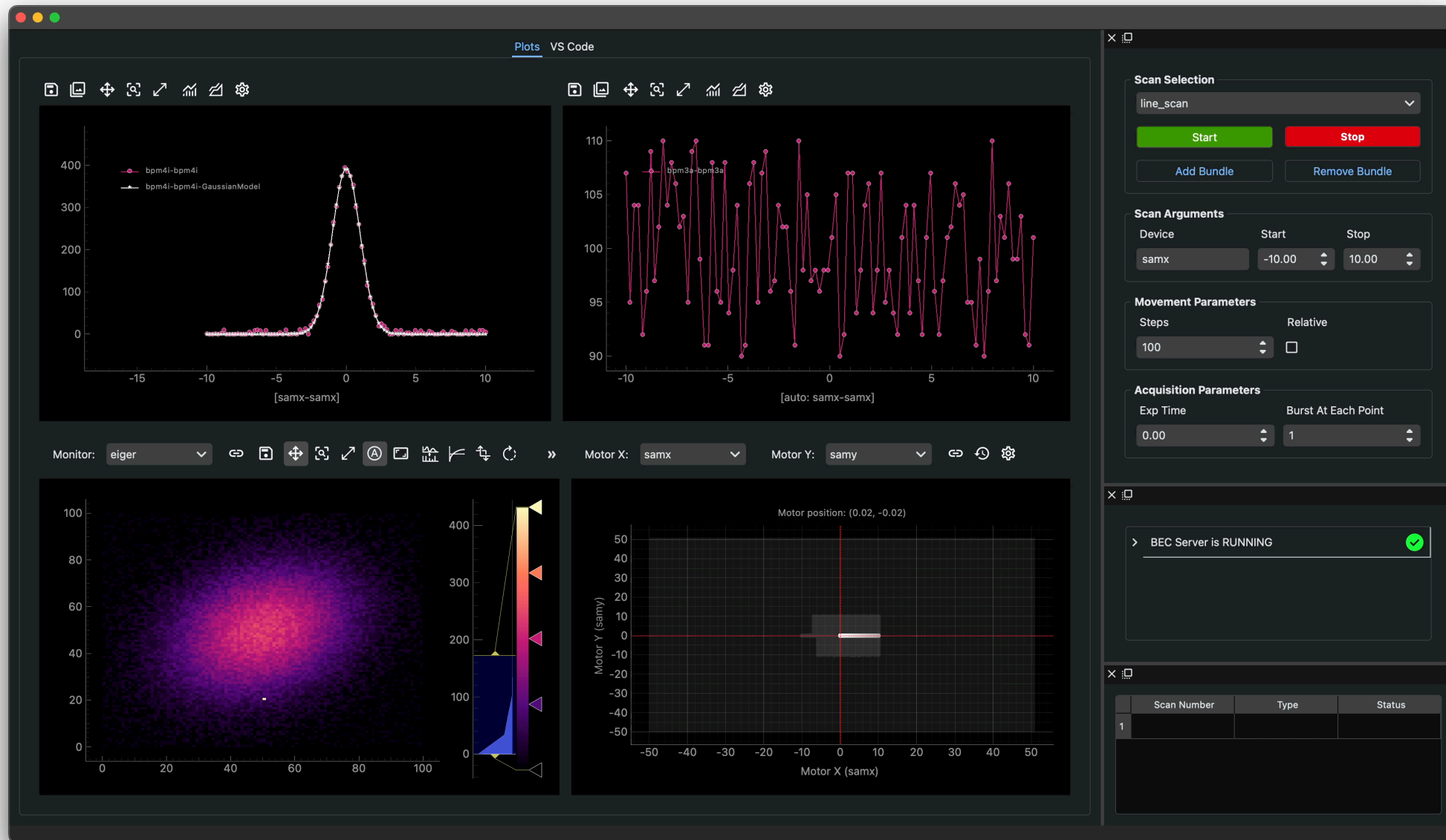
Out [4]:
ScanReport:
-----
Status: COMPLETED
Start time: Mon Jul 22 21:47:45 2024
End time: Mon Jul 22 21:47:48 2024
Elapsed time: 2.9 s
Scan ID: cfcee722-4f45-4538-ae55-f48f65980478
Scan number: 13
Number of points: 100

• demo [5/14] >>
```

Visual Studio Code



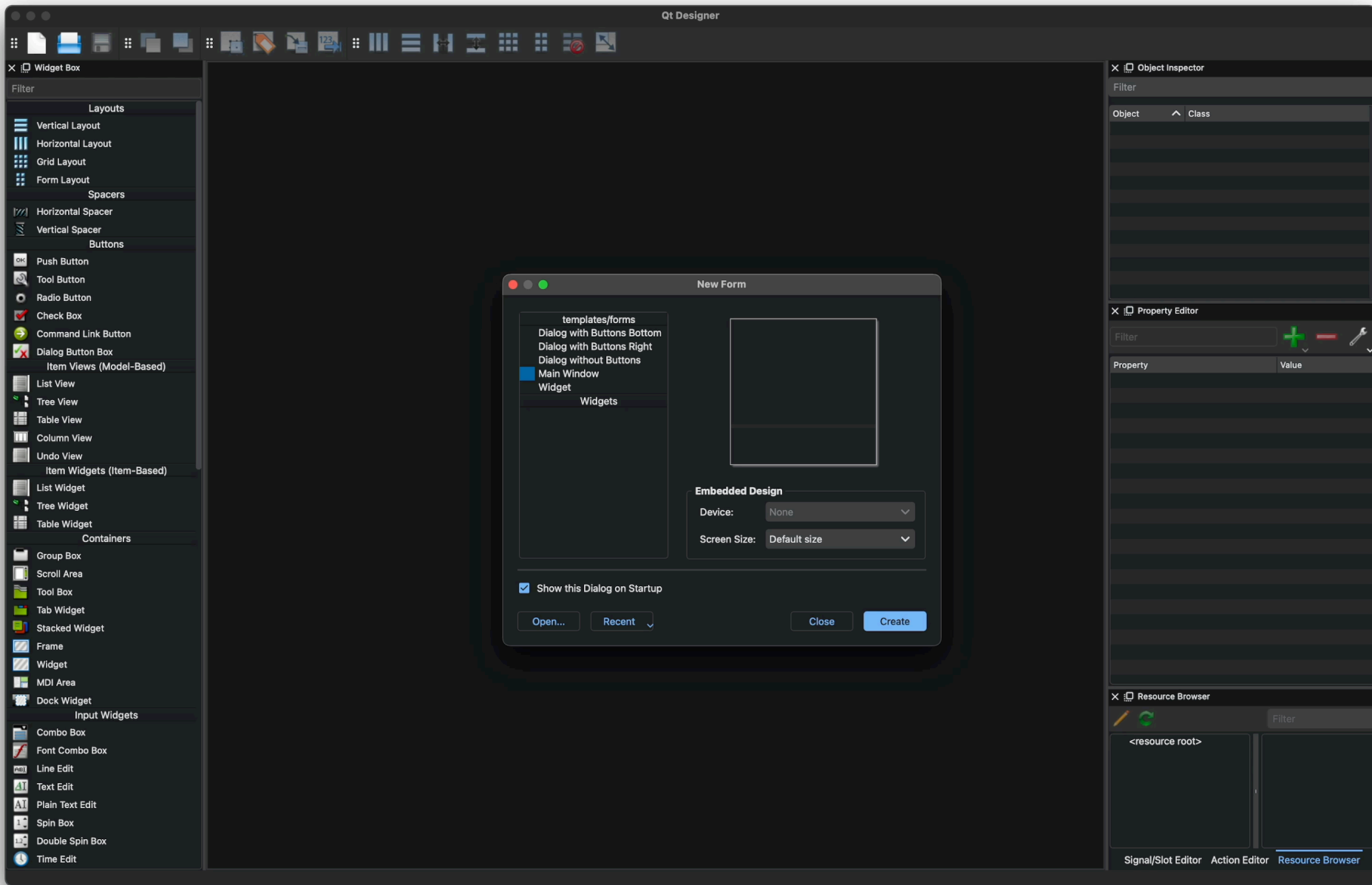
Example General Purpose App

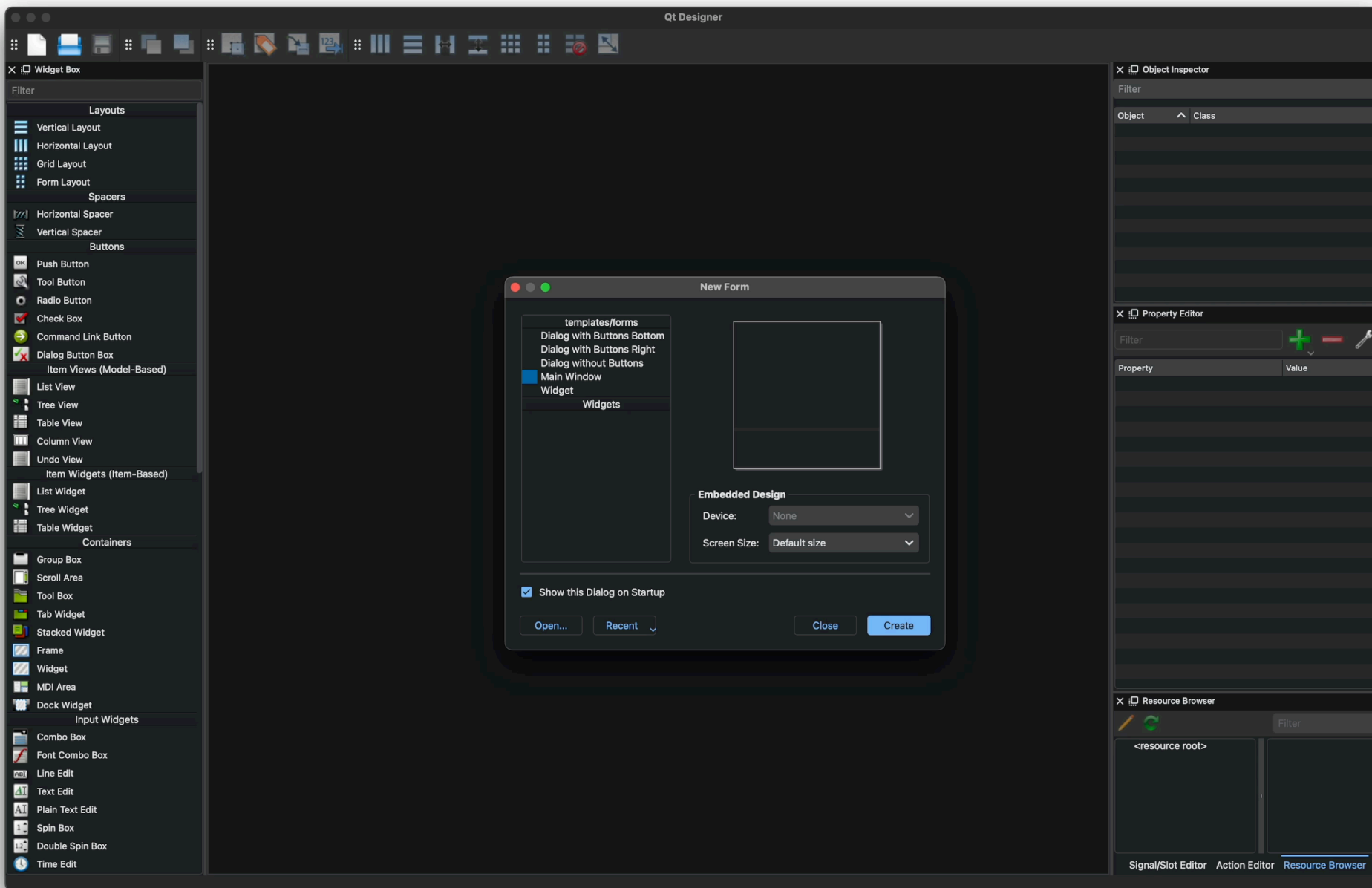


One more thing...



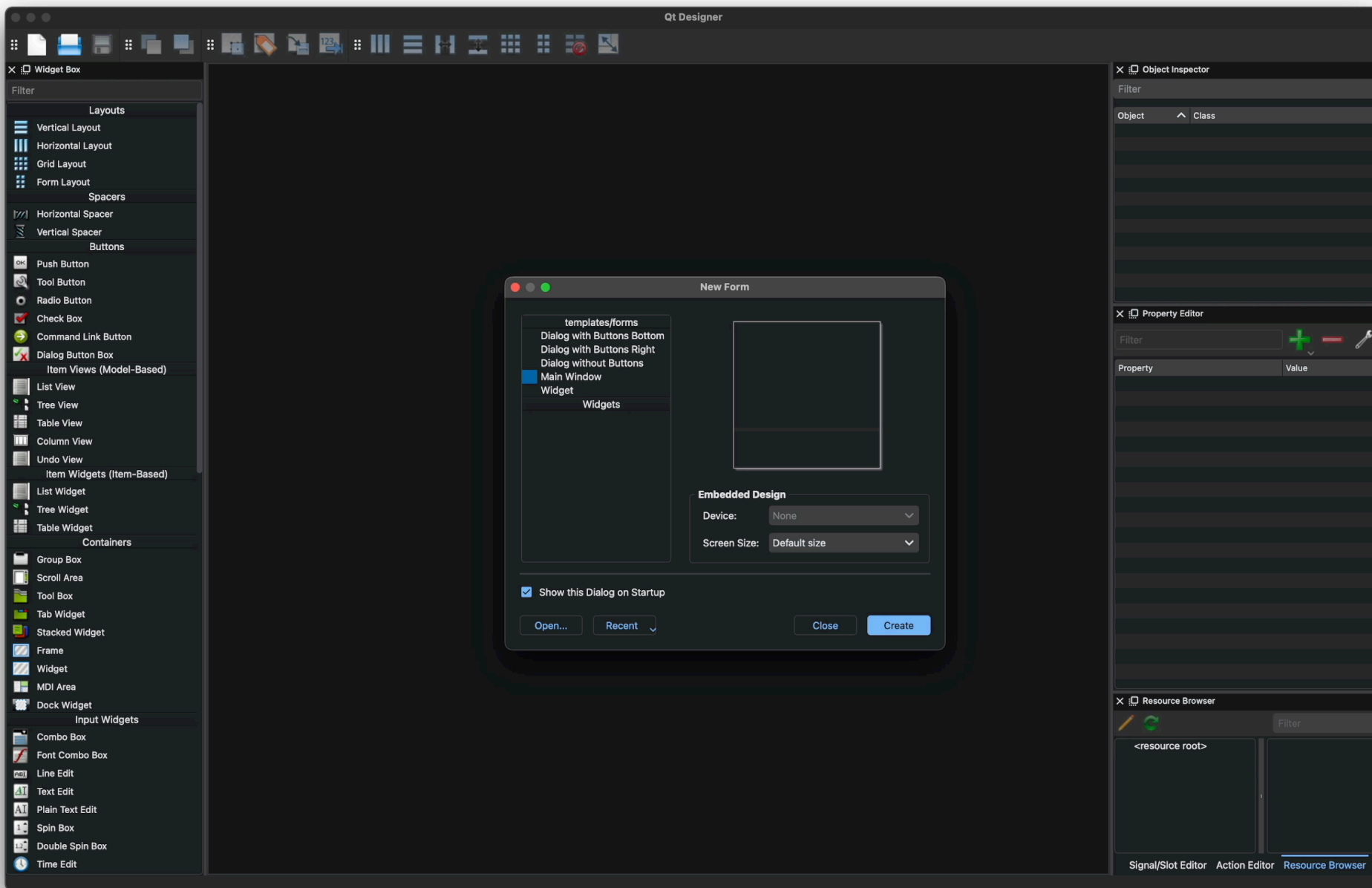
BEC QT DESIGNER





App Goals

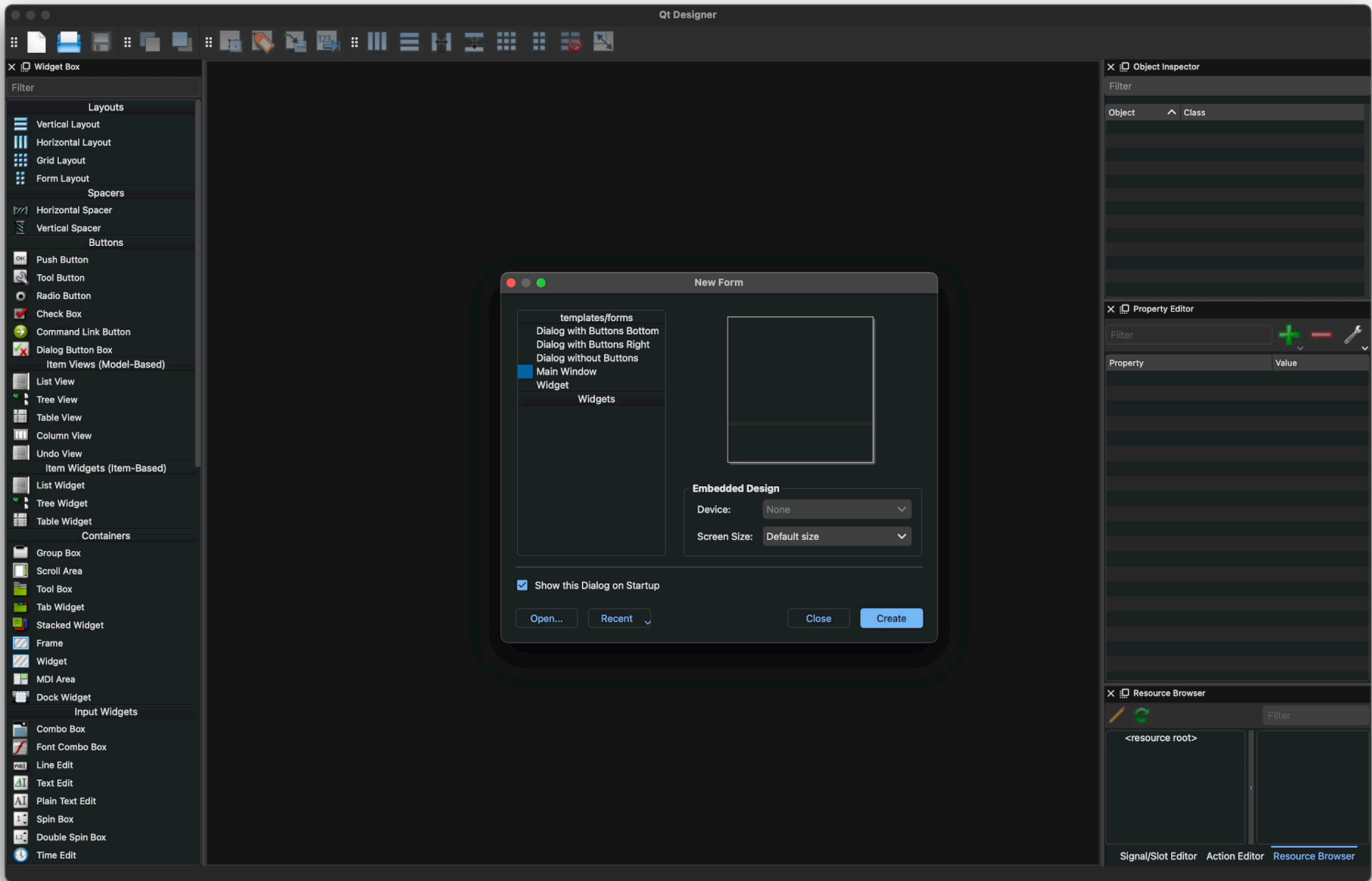
- Plot tab
- VS Code
- Scan Control
- Monitor BEC



App Goals

- Plot tab
- VS Code
- Scan Control
- Monitor BEC

Can I complete
it in under
5 minutes?





Future Outlook



Deeper VS Code integration



Region of interest tools for plots



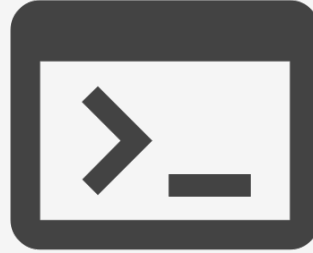
Scan manager for scan planing



DAP extension + interactive fitting

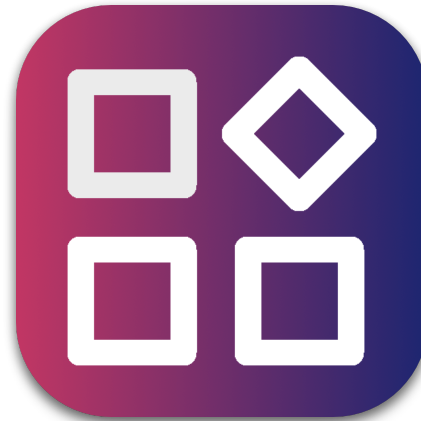
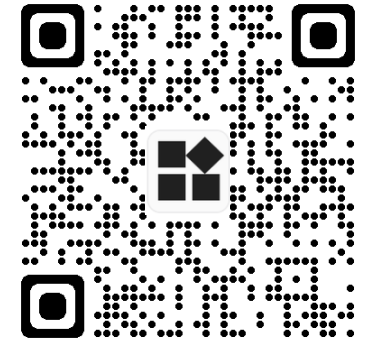


GUI Launcher for ui files



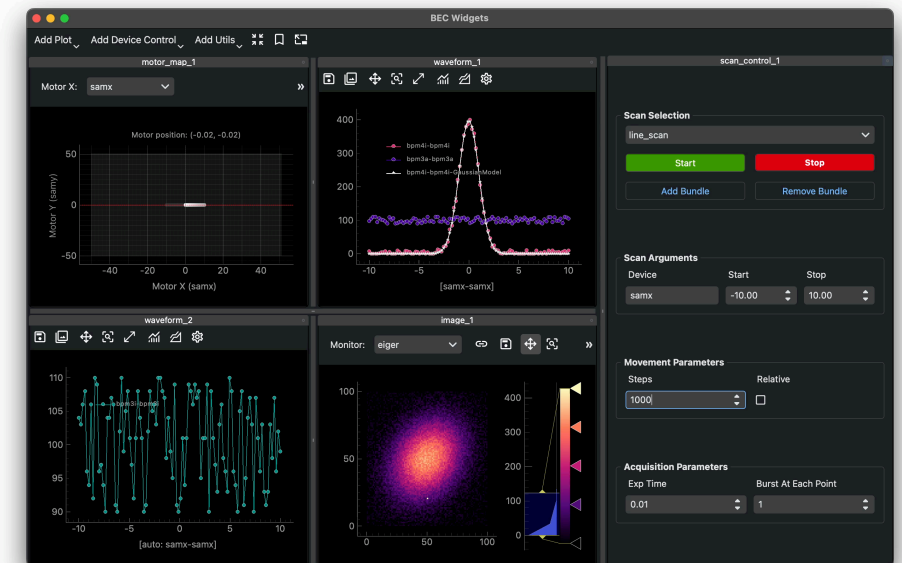
Scripting on BEC events

Command Line Interface



Flexible independent BL development

Quick adaptation for situation



BEC QT DESIGNER