Step 1 Install OpenGate  
Please refer to **Gate\_installation** for detailed installation instructions.

Important: Please install **Gate 9.2** and **Geant4 11.2.2**.

Step 2 Adjust the parameters

There are 3 files you need to adjust: **main.submit**, **sources.mac** and **phantom.mac**.

**main.submit:**

This is a script used to control multiprocessing. You need to modify the paths to **Gate** and **main.mac**. Please adjust the number of running processes based on the number of CPU cores on your computer.

**sources.mac:**

This is a section of code for setting up the light source.

The line `/gate/source/xraygun/setActivity 1000000 becquerel` sets the number of photons.

The more photons, the clearer the image and the more distinct the contrast.

Running with 1 million photons takes about one hour and produces results that are visibly distinguishable to the naked eye.

Running with 10 million photons takes approximately eight hours.

`/gate/source/xraygun/gps/centre 0 0 650.6195 mm` is used to set the position of the light source. The three parameters represent the x, y, and z coordinates of the source in the world coordinate system.

**phantom.mac：**

The line `/gate/brain\_mri/geometry/setImage mac/first.mhd` sets the information of the phantom.

The following two lines of code indicate a 180-degree rotation around the y-axis:

/gate/brain\_mri/placement/setRotationAxis 0 1 0

/gate/brain\_mri/placement/setRotationAngle 180 deg

Similarly, to rotate -90 degrees around the x-axis, use 1 0 0 and -90 deg.