

Hands on Magnetic Field with spot scanning

The base directory of this hands on is [/home/g4user/work/medical/scan](#)

You need to change the command path in following slides if you want to try in other directory.

1. prepare tutorial source

download source code (Galet_MagneticField_scan.tgz) and place in
/home/g4user/work/medical/scan

```
> cd ~/work/medical/scan
```

```
> tar zxvf Galet_MagneticField_scan.tgz
```

```
>
```

```
> mkdir Galet-v11-MedEx-Galet-v11-MedEx-build
```

```
> mkdir Galet-v11-MedEx-Galet-v11-MedEx-install
```

```
> cd Galet-v11-MedEx-Galet-v11-MedEx-build
```

```
> cmake -DCMAKE_INSTALL_PREFIX=../Galet-v11-MedEx-Galet-v11-MedEx-install ¥  
../Galet-v11-MedEx-Galet-v11-MedEx
```

```
> make
```

```
> make install
```

Hands on Magnetic Field with spot scanning

The base directory of this hands on is `/home/g4user/work/medical/scan`

You need to change the command path in following slides if you want to try in other directory.

2. prepare run

```
> cd ~/work/medical/scan/Galet-vll-MedEx-Galet-vll-MedEx-install
> mkdir run
> cd ~/work/medical/scan/Galet-vll-MedEx-Galet-vll-MedEx-install/run
> cp ~/work/medical/scan/Galet-vll-MedEx-Galet-vll-MedEx/*mac .
```

Hands on Magnetic Field with spot scanning

The base directory of this hands on is `/home/g4user/work/medical/scan`

You need to change the command path in following slides if you want to try in other directory.

3. hands on

compile

```
> cd /home/g4user/work/medical/scan/Galet-v11-MedEx-Galet-v11-MedEx-build  
> make  
> make install
```

run directory

```
> cd ~/work/medical/scan/Galet-v11-MedEx-Galet-v11-MedEx-install/run
```

run

```
> ../bin/Galet
```

or

```
> ../bin/Galet -m run0.mac
```

- a. Understand the spot scanning in particle therapy
- b. Move the spot by changing the strength of magnetic field

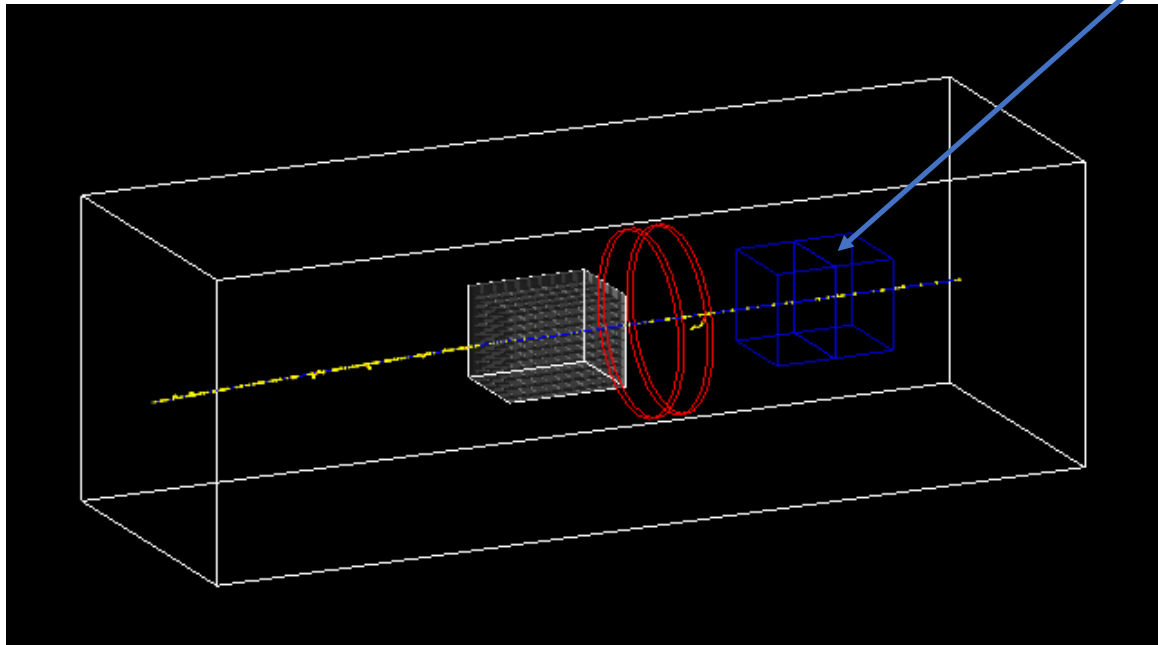
Hands on Magnetic Field with spot scanning

The base directory of this hands on is [/home/g4user/work/medical/scan](#)

You need to change the command path in following slides if you want to try in other directory.

check the geometry
> ../bin/Galet

scanning magnet is placed
but no magnetic field is applied.



Hands on Magnetic Field with spot scanning

The base directory of this hands on is `/home/g4user/work/medical/scan`

You need to change the command path in following slides if you want to try in other directory.

spot position setting of this hands on consists of two parts.

1. EventAction.cxx L68

```
void EventAction::BeginOfEventAction(const G4Event* event){  
    MagneticFieldManager* magmanager = MagneticFieldManager::GetMagneticFieldManager();  
    G4ThreeVector target((event->GetEventID()%5-2)*30,(event->GetEventID()%5-2)*30,0);  
    magmanager->UpdateField(target,event->GetPrimaryVertex()->GetPrimary()->GetTotalMomentum());  
}
```

2. MagneticFieldManager.cxx L91

```
inline void MagneticFieldManager::UpdateField(G4ThreeVector din, G4double pmom)  
{  
    ...  
    G4String fnx="MFBLVx";  
    G4String fny="MFBLVy";  
    magneticfieldx = dxin*0.03*tesla;  
    magneticfieldy = dyin*0.02*tesla;  
    ...  
}
```

Hands on Magnetic Field with spot scanning

The base directory of this hands on is `/home/g4user/work/medical/scan`

You need to change the command path in following slides if you want to try in other directory.

compile

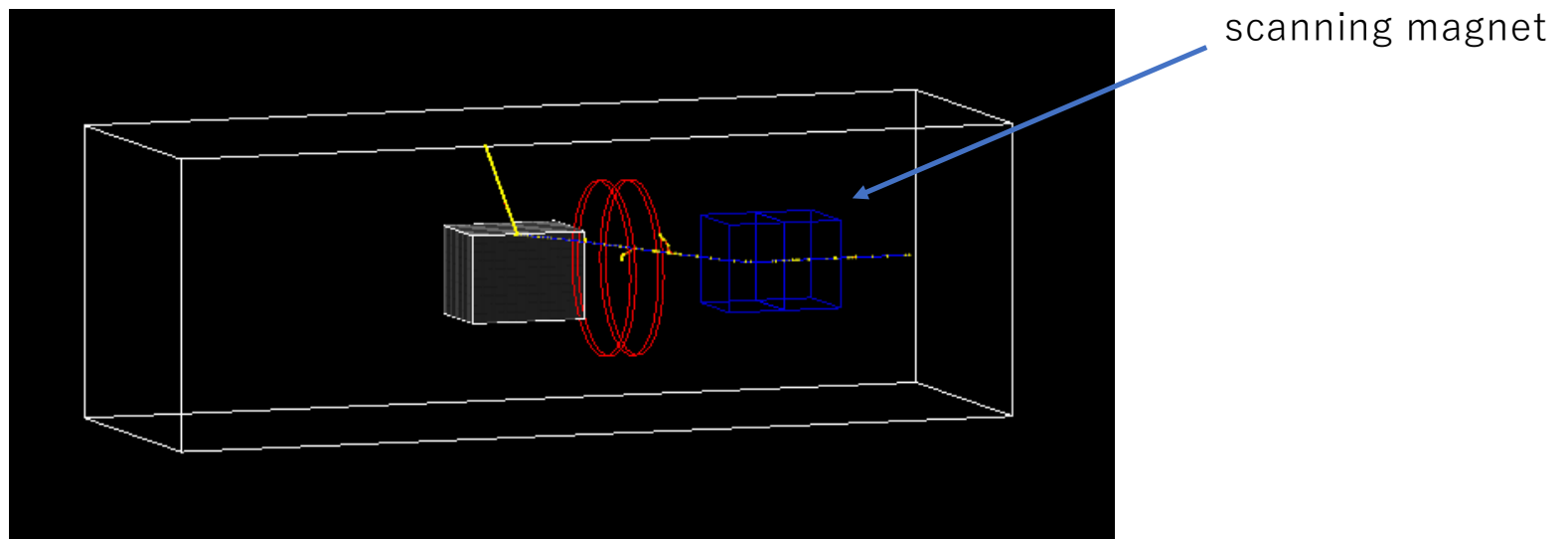
```
> cd /home/g4user/work/medical/scan/Galet-v11-MedEx-Galet-v11-MedEx-build
```

```
> make
```

```
> make install
```

move to run directory

```
> cd ~/work/medical/scan/Galet-v11-MedEx-Galet-v11-MedEx-install/run
```



Hands on Magnetic Field with spot scanning

The base directory of this hands on is [/home/g4user/work/medical/scan](#)

You need to change the command path in following slides if you want to try in other directory.

add number of simulation, run and check result

edit run0.mac

```
/run/beamOn 1
```



```
/run/beamOn 1000
```

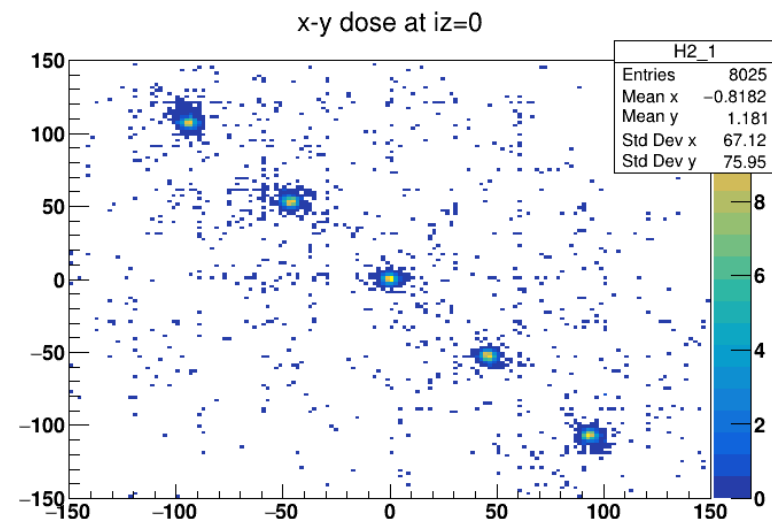
run

```
> ../bin/Galet -m run0.mac
```

check

```
> root -l Galet.root
```

```
root [0] H2_1 ->Draw("colz")
```



Hands on Magnetic Field with MRgRT

The base directory of this hands on is `/home/g4user/work/medical/MRgRT`

You need to change the command path in following slides if you want to try in other directory.

1. prepare tutorial source

download source code (Galet_MagneticField_MRgRT.tgz) and place in
`/home/g4user/work/medical/MRgRT`

```
> cd ~/work/medical/MRgRT
> tar zxvf Galet_MagneticField_MRgRT.tgz
>
> mkdir Galet-v11-MedEx-Galet-v11-MedEx-build
> mkdir Galet-v11-MedEx-Galet-v11-MedEx-install
> cd Galet-v11-MedEx-Galet-v11-MedEx-build
> cmake -DCMAKE_INSTALL_PREFIX=../Galet-v11-MedEx-Galet-v11-MedEx-install ¥
../Galet-v11-MedEx-Galet-v11-MedEx
> make
> make install
```


Hands on Magnetic Field with MRgRT

The base directory of this hands on is `/home/g4user/work/medical/MRgRT`

You need to change the command path in following slides if you want to try in other directory.

2. prepare run

```
> cd ~/work/medical/MRgRT/Galet-v11-MedEx-Galet-v11-MedEx-install
> mkdir run
> cd ~/work/medical/MRgRT/Galet-v11-MedEx-Galet-v11-MedEx-install/run
> cp ~/work/medical/MRgRT/Galet-v11-MedEx-Galet-v11-MedEx/*mac .
```

Hands on Magnetic Field with MRgRT

The base directory of this hands on is `/home/g4user/work/medical/MRgRT`

You need to change the command path in following slides if you want to try in other directory.

3. hands on

compile

```
> cd /home/g4user/work/medical/MRgRT/Galet-v11-MedEx-Galet-v11-MedEx-build  
> make  
> make install
```

run directory

```
> cd ~/work/medical/MRgRT/Galet-v11-MedEx-Galet-v11-MedEx-install/run
```

run

```
> ../bin/Galet
```

or

```
> ../bin/Galet -m run0.mac
```

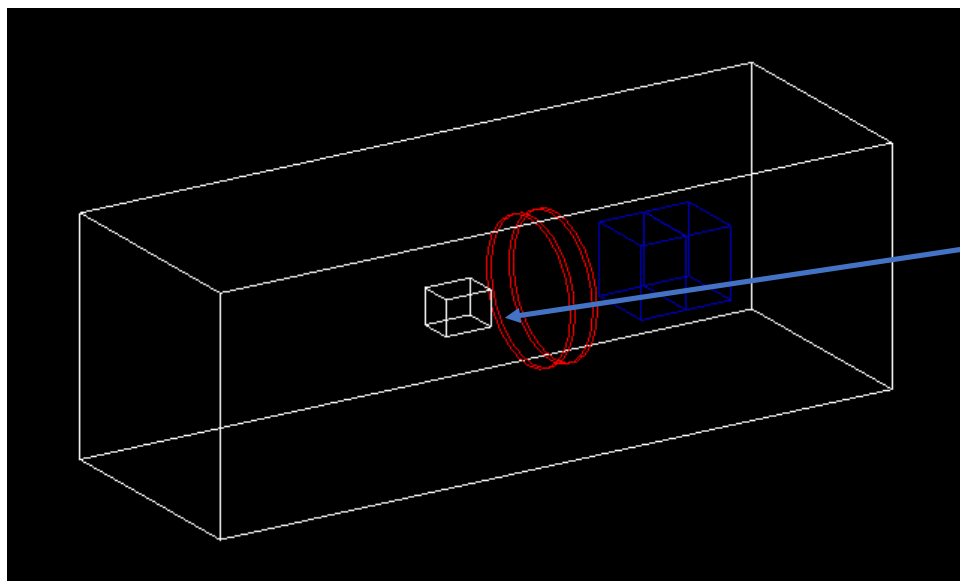
Hands on Magnetic Field with MRgRT

The base directory of this hands on is [/home/g4user/work/medical/MRgRT](#)

You need to change the command path in following slides if you want to try in other directory.

This hands on uses parallel world geometry.

Magnetic field is placed in mass geometry and phantom is placed in parallel world.



Only magnetic field is placed in mass world.
The detail of parallel world simulation is
L I I and other hands on.

a. change the strength of magnetic field

Hands on Magnetic Field with MRgRT

The base directory of this hands on is `/home/g4user/work/medical/MRgRT`

You need to change the command path in following slides if you want to try in other directory.

This sentence is needed at the end of phys.mac to use parallel world

```
#####  
# ParallelWorld Physics  parallelWorldName:s Layeredmass:b  
#####  
/Galet/physics/pwProcess paraWorld true  
#
```

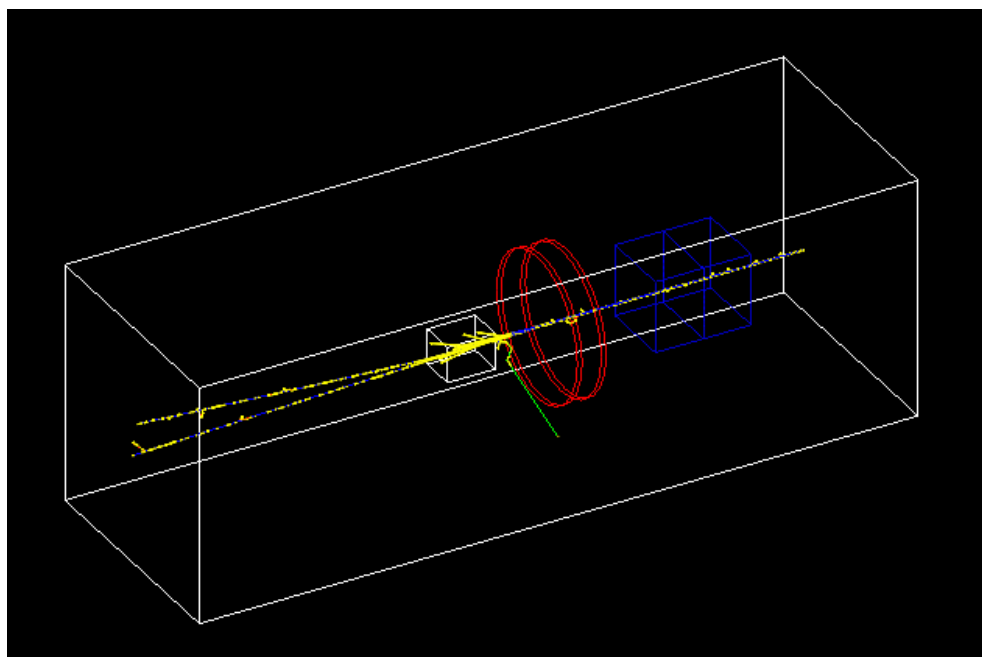
Hands on Magnetic Field with MRgRT

The base directory of this hands on is [/home/g4user/work/medical/MRgRT](#)

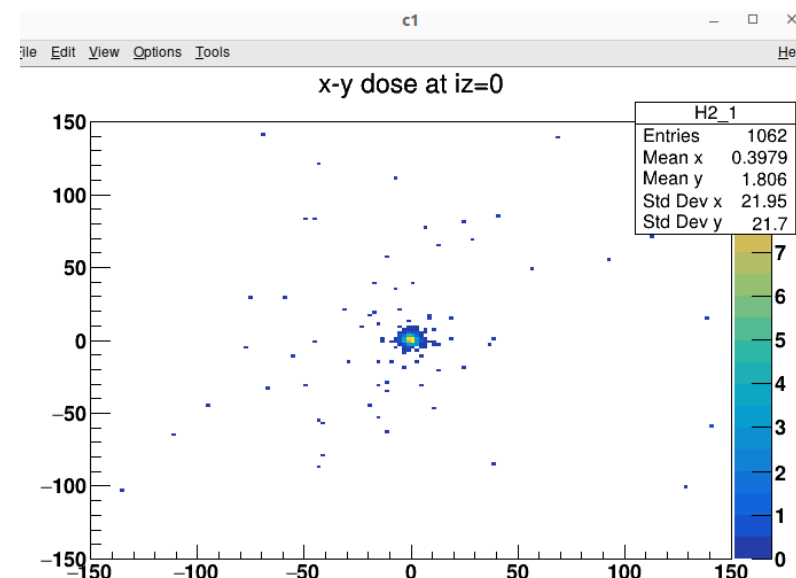
You need to change the command path in following slides if you want to try in other directory.

check the geometry

```
> ../bin/Galet
```



```
/run/beamOn 10
```



Galet.root, H2_1, 1000evts

Hands on Magnetic Field with MRgRT

The base directory of this hands on is [/home/g4user/work/medical/MRgRT](#)

You need to change the command path in following slides if you want to try in other directory.

Its' impossible thought ... B=0T to B=50T

DetectorConstruction.cxx

L=289

```
//  
// Magnetic Field for MRI  
//  
G4String fieldnamey_MRI = "MRILV";  
auto* magFieldmri = new GaletMagneticField(fieldnamey_MRI);  
magFieldmri->SetFieldY(50.*tesla);  
magFieldmri->SetFieldX(0.*tesla);  
//  
SetMagneticField(fieldnamey_MRI, magFieldmri);
```

Hands on Magnetic Field with MRgRT

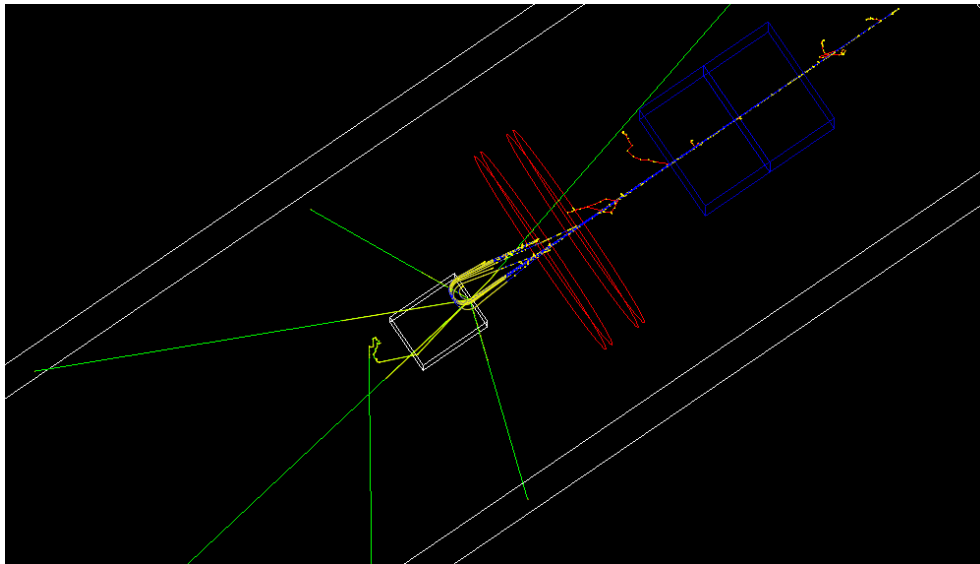
The base directory of this hands on is `/home/g4user/work/medical/MRgRT`

You need to change the command path in following slides if you want to try in other directory.

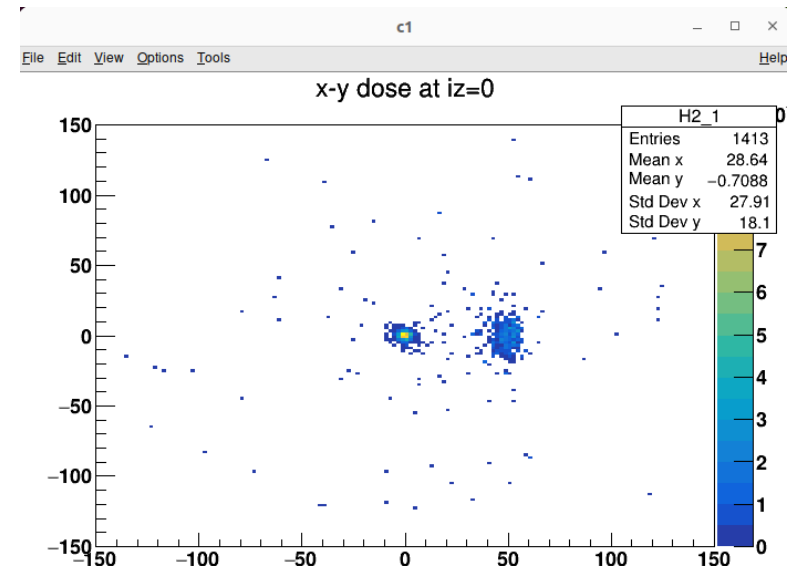
check the geometry

```
> cd ~/work/medical/MRgRT/Galet-v11-MedEx-Galet-v11-MedEx-install/run
```

```
> ../bin/Galet
```



`/run/beamOn 10`



Galet.root, H2_1, 1000evts