

# A Rough Estimate of Radiation Dose in a FerroFluid Seal

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- Motivation
- Method
- Status

# Why

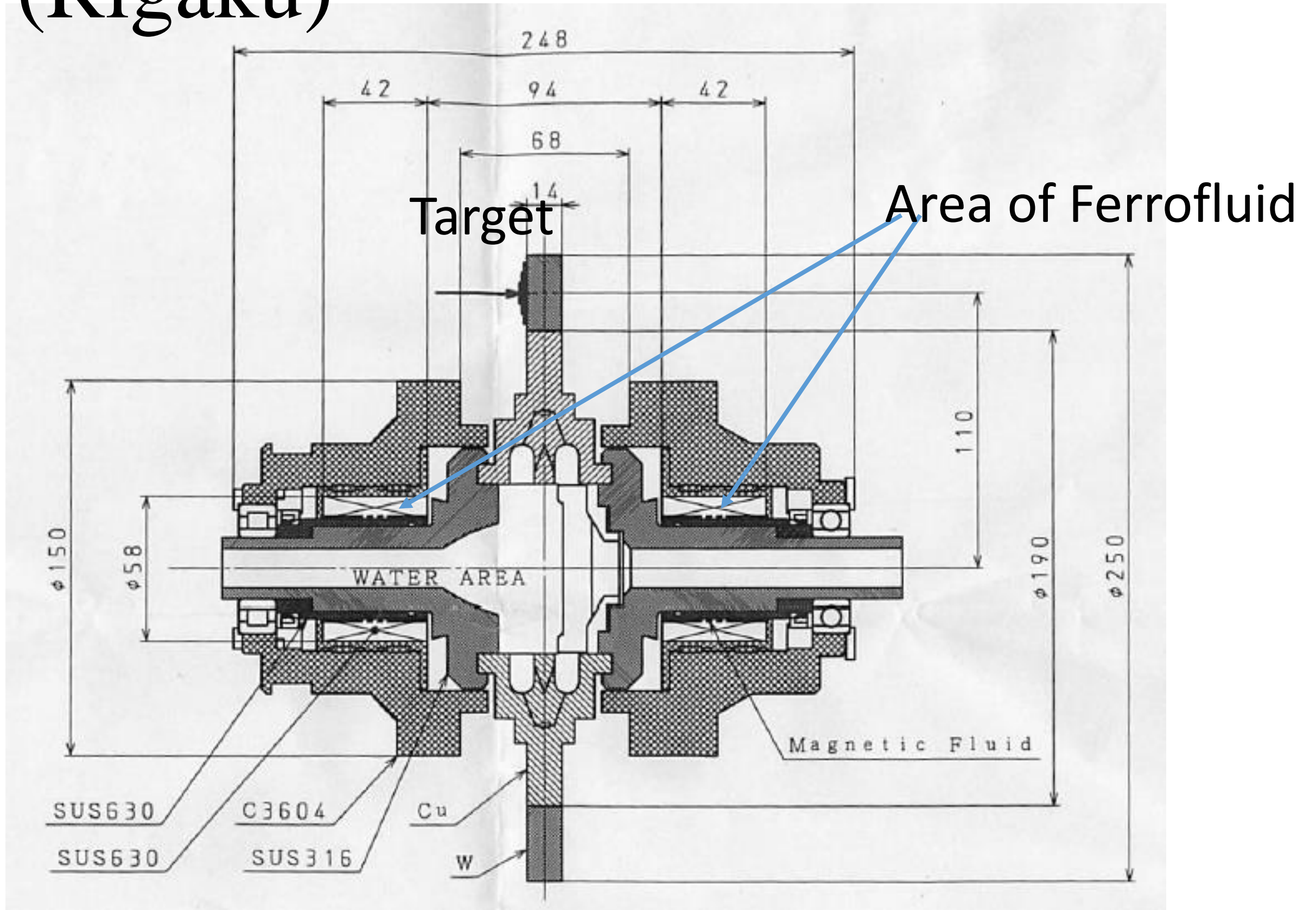
- Ferrofluid is a candidate for the vacuum seal of the positron targets.
  - Undulator target
  - Conventional Target w/ slow rotating
- Radiation damage could be an issue for the seal.
- Rigaku gave us a drawing of slow rotating target with the ferrofluid seal



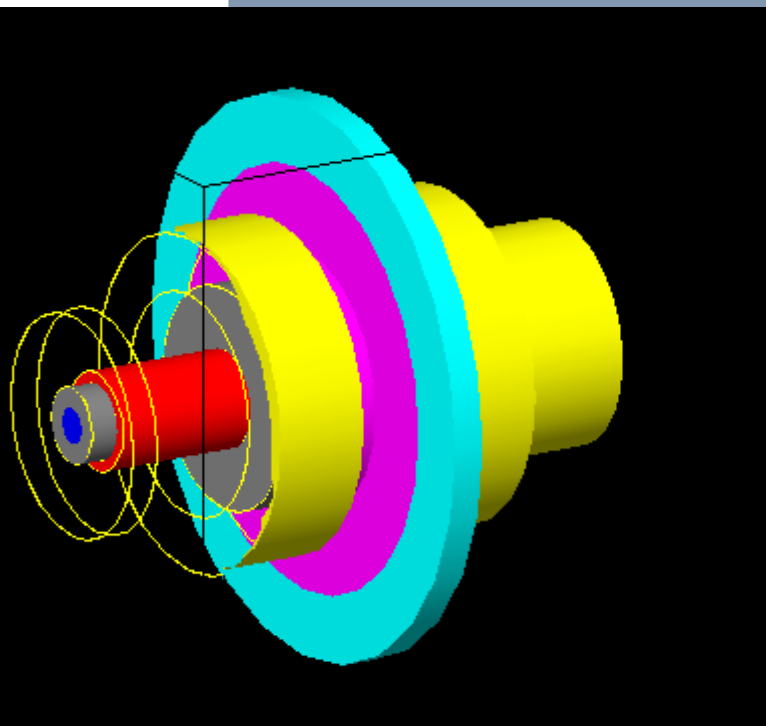
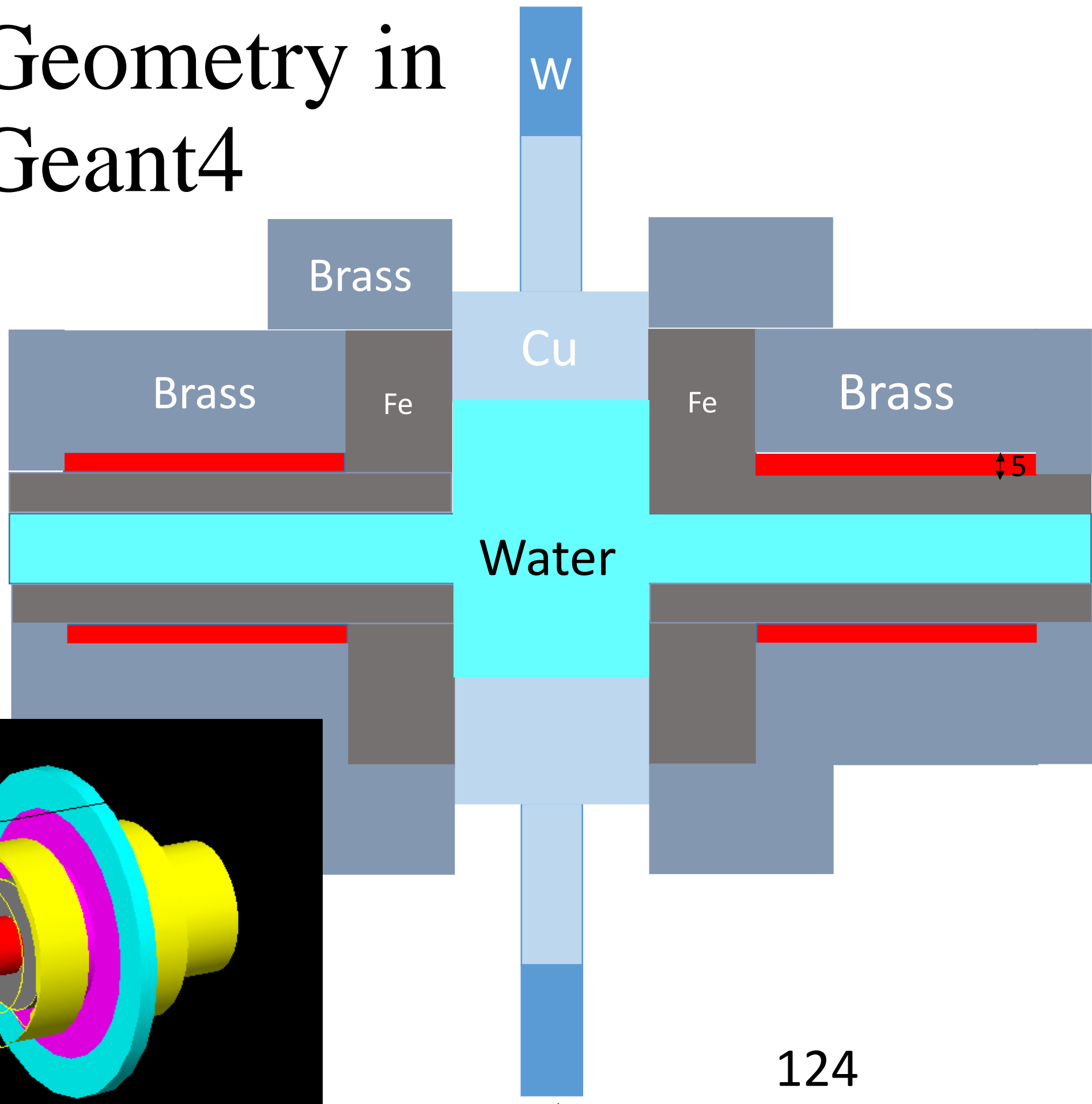
Let's see it

- Reference numbers for an irradiation experiment.

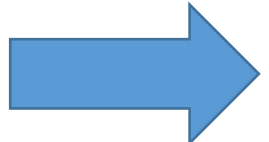
# A model of slow rotating target (Rigaku)



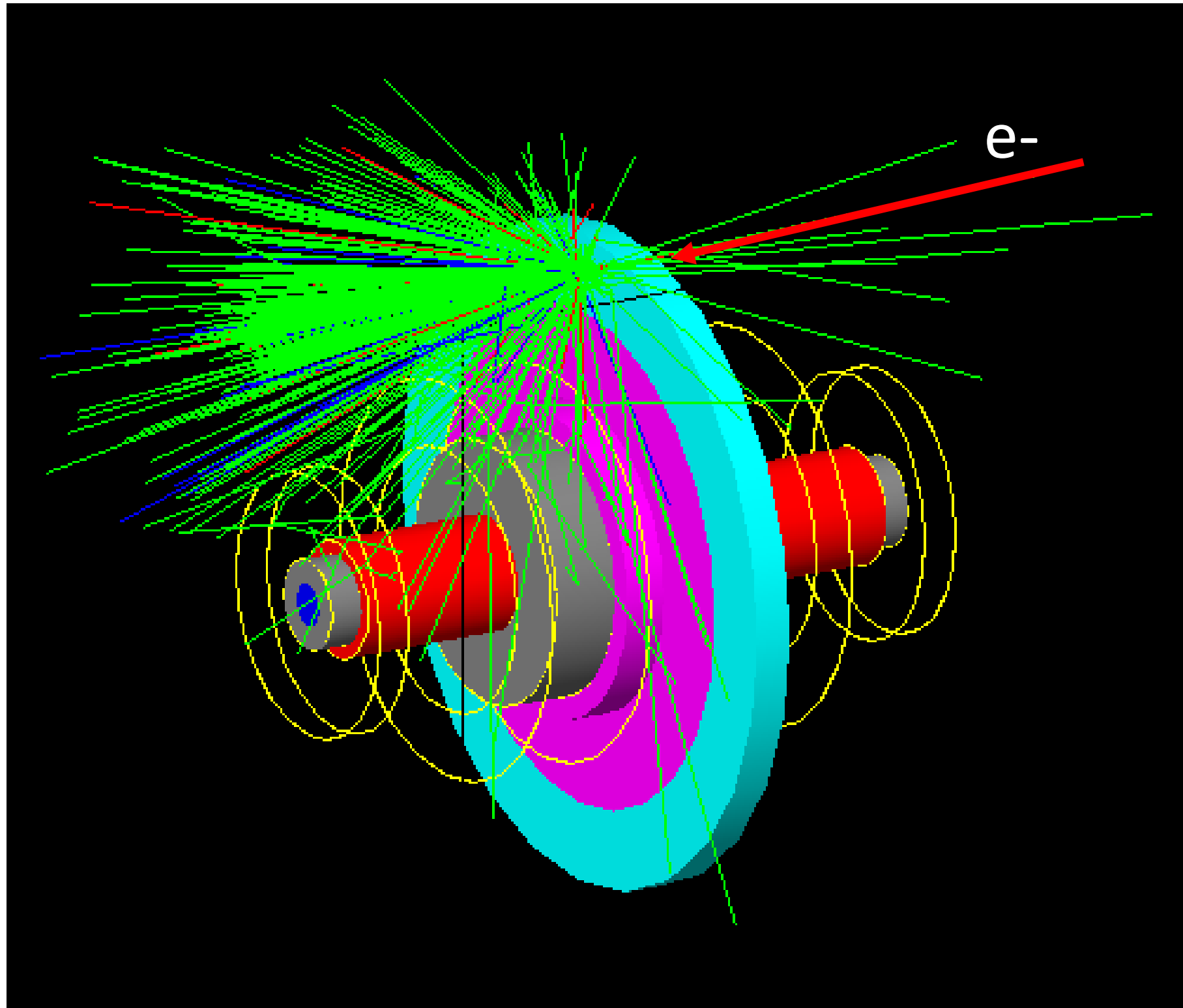
# Geometry in Geant4



# Calculation

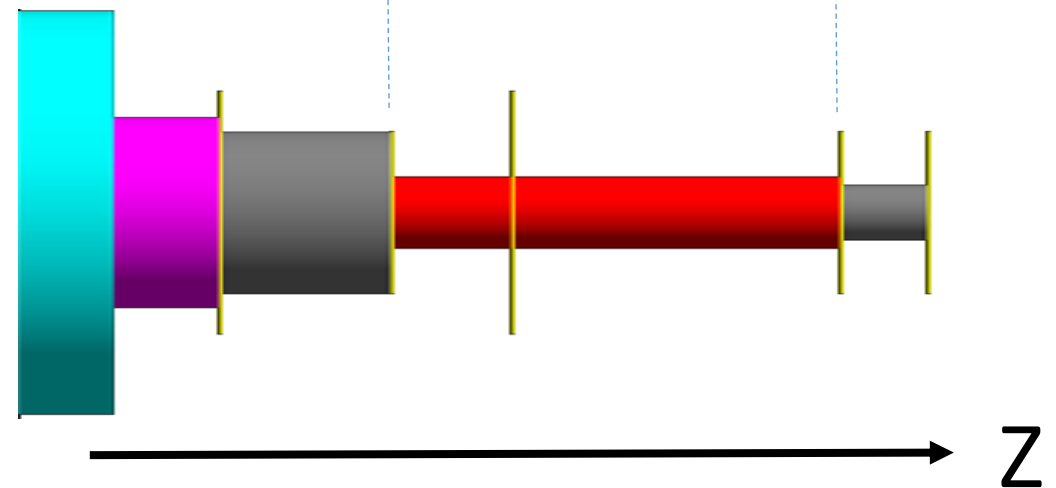
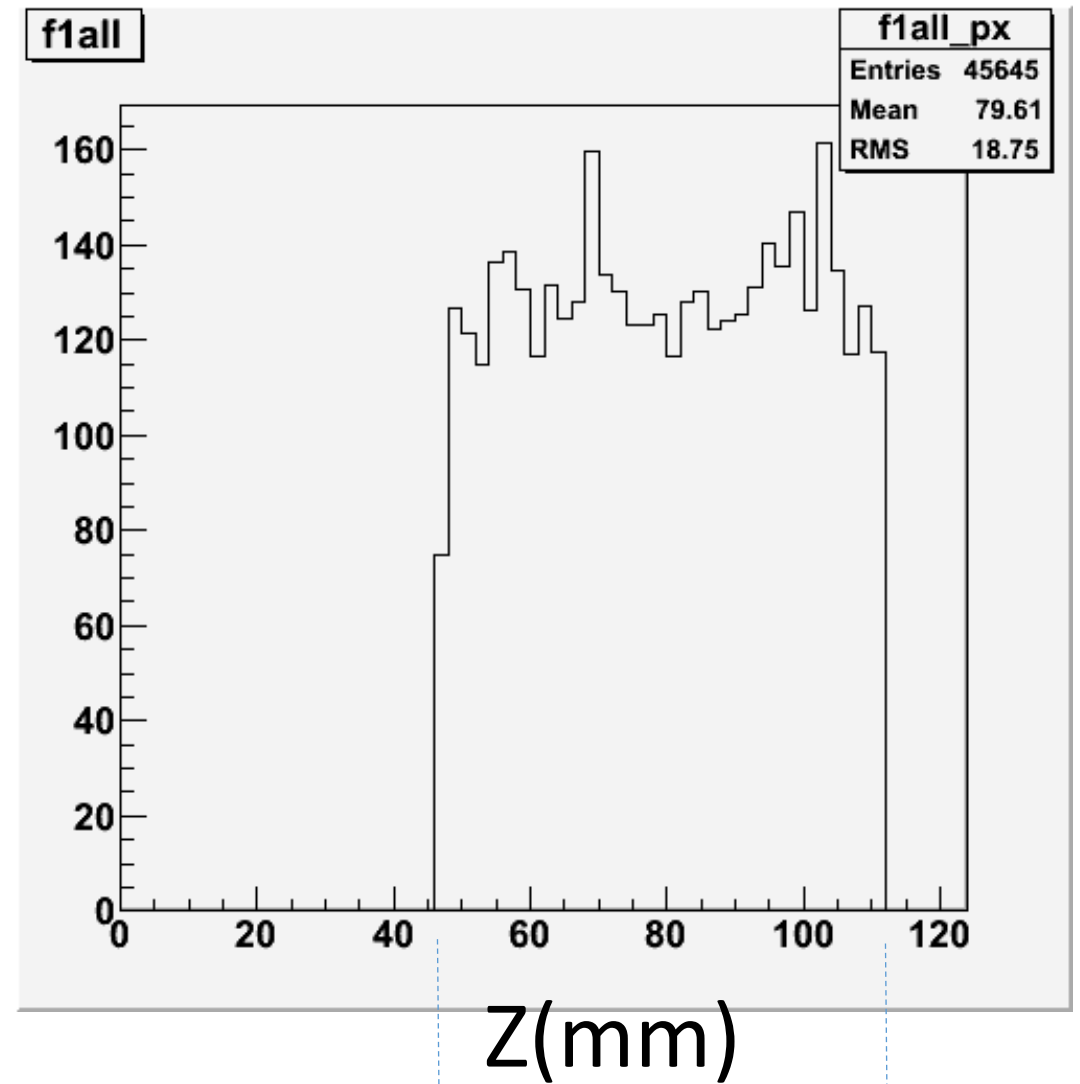
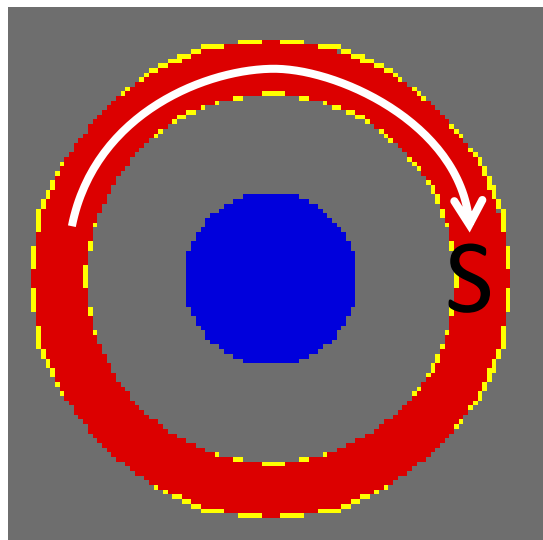
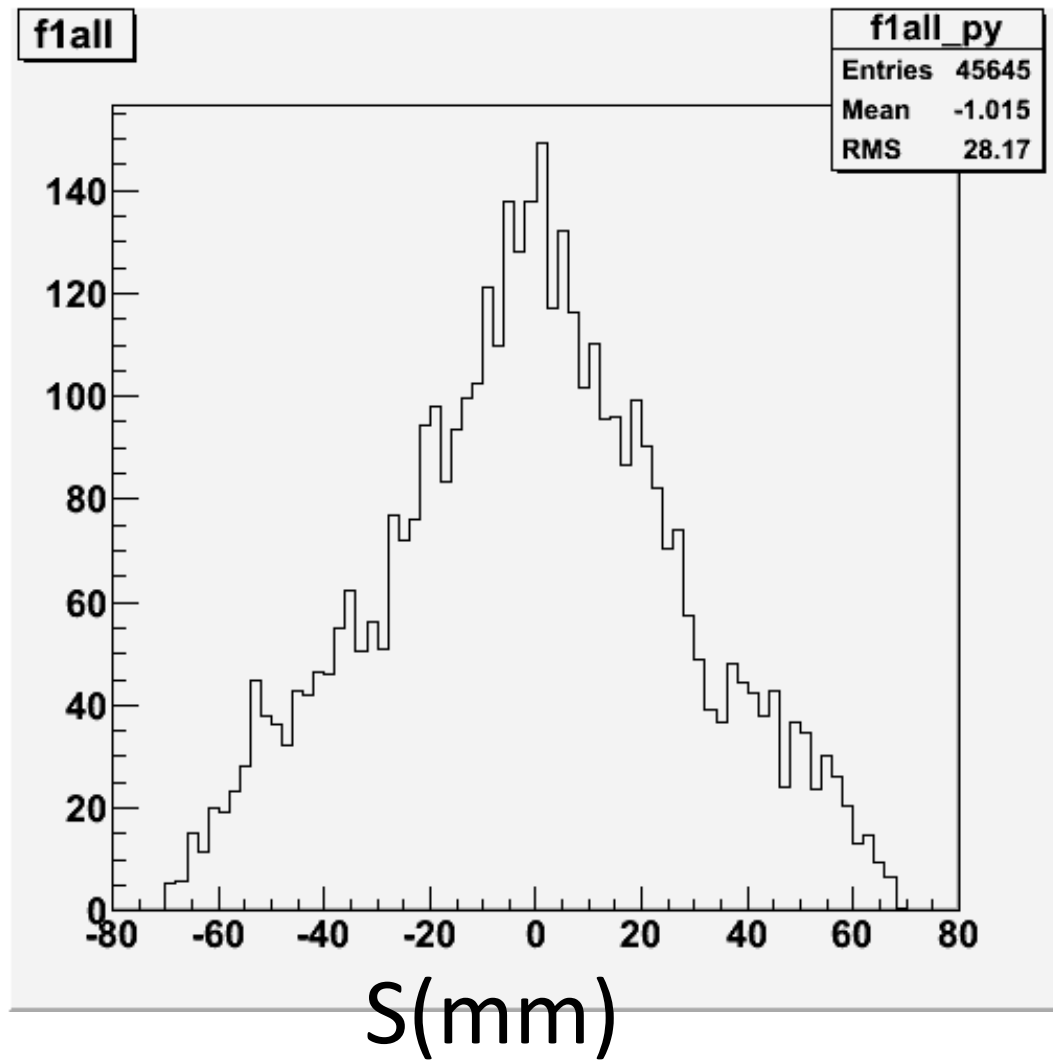
- Geant4 tool kit
  - pre-packaged physics list “Shielding”
    - W/ default parameters
- Ferrofluid
  - Fe
  - Naphthalene (C<sub>8</sub>H<sub>10</sub>)
    -  Details will be provided by Rigaku
- 6 GeV e<sup>-</sup> on 14 mm W

# Example



# Results

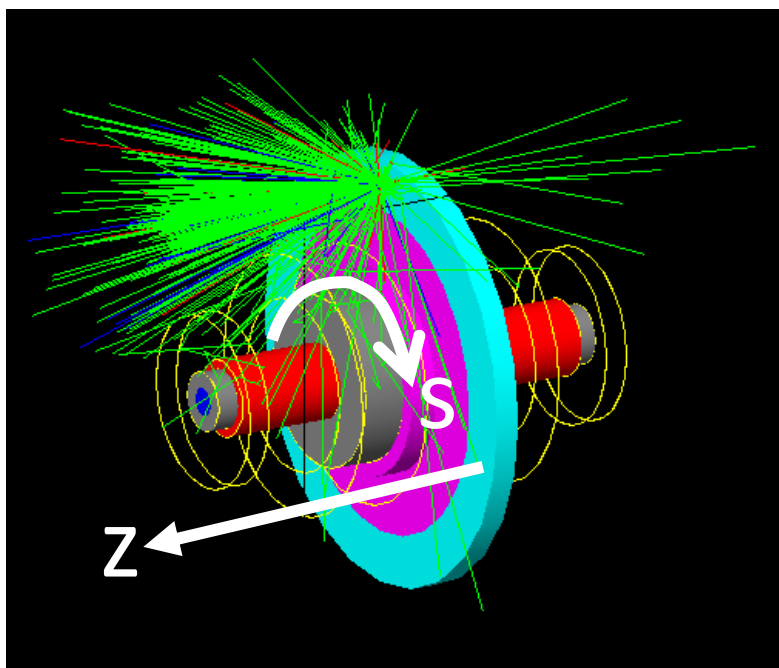
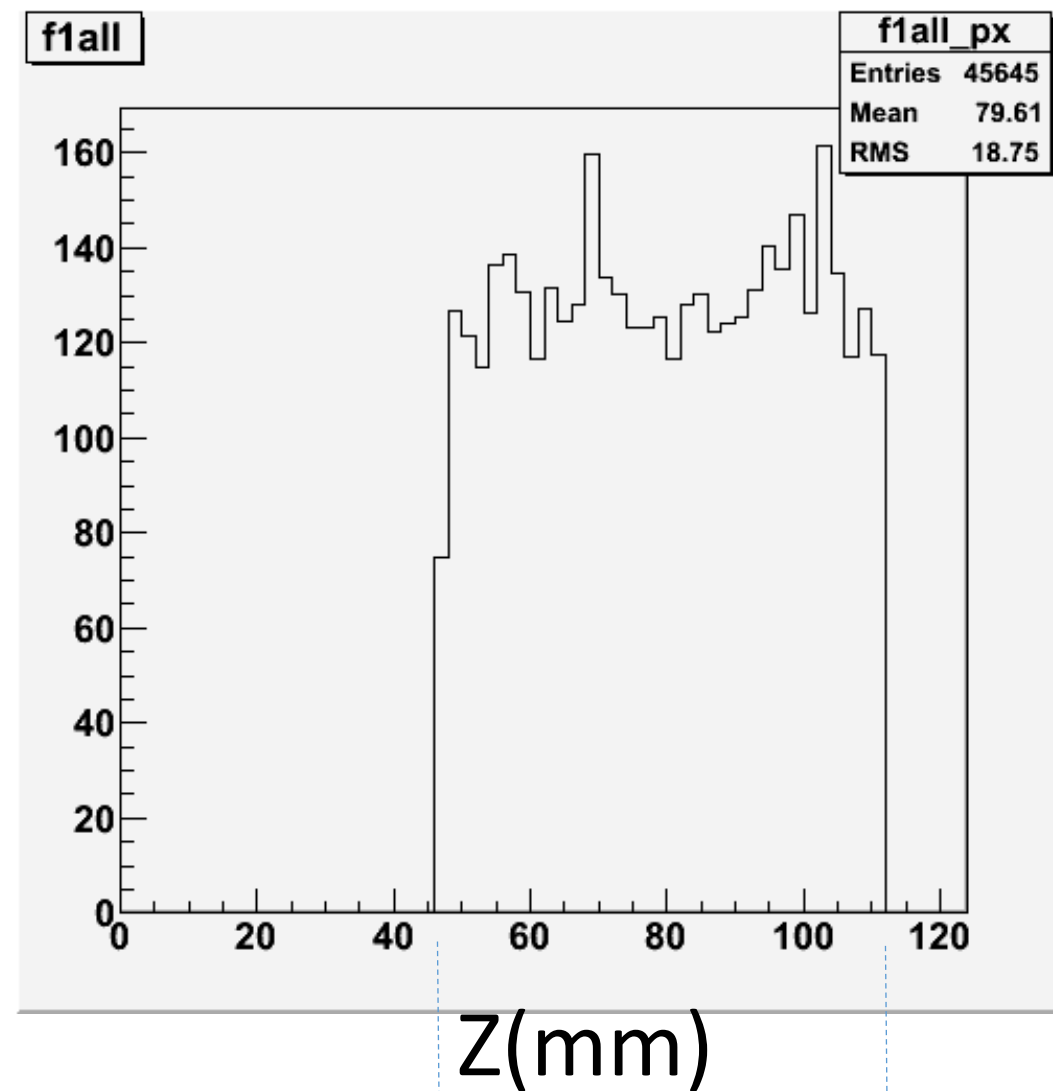
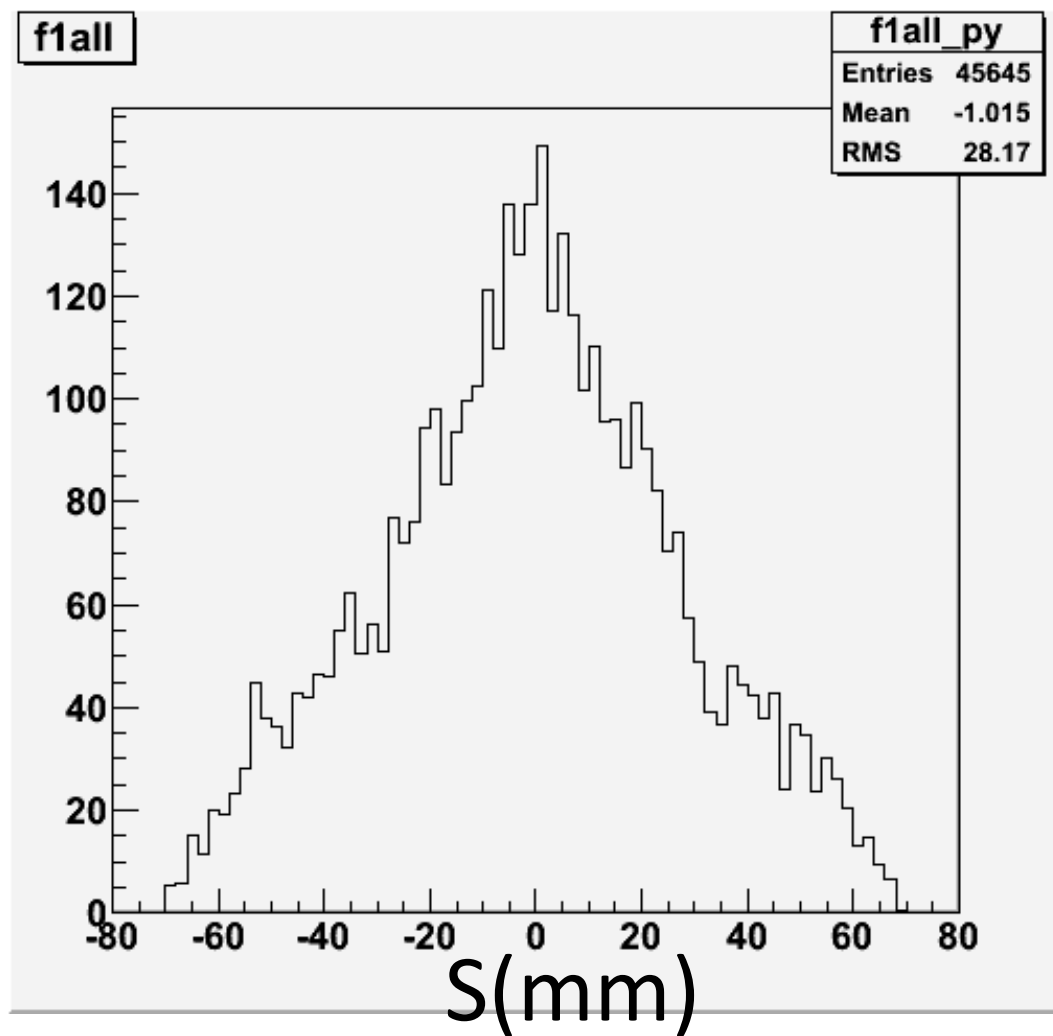
Energy Deposit(MeV)/2mm/10<sup>5</sup>e-





# Results

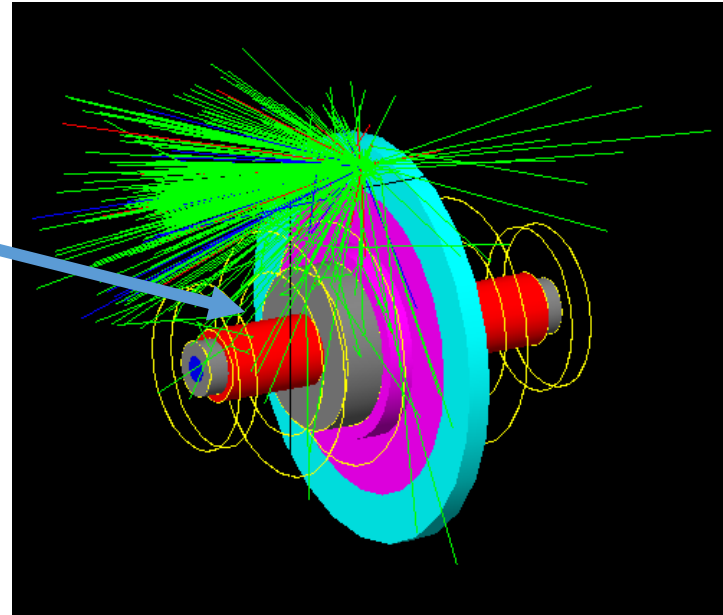
Energy Deposit(MeV)/2mm/10<sup>5</sup>e-



# Very Preliminarily results

- At Peak

- 280MGy/year



- The Average over the volume

- 120MGy/year

# Summary and Outlook

- Details; to be confirmed
  - Are the results reasonable?
    - Nuclear interactions
    - Parameters of the simulation
      - (such as low energy cuts,,)
    - Activation of the target, Residual radiation,,
- Near Future
  - Components of the ferrofluid from Rigaku
  - Feedback to Rigaku, update the drawing
  - Irradiation experiments at JAEA Takasaki.