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# Experiments of the Time Resolved Beam Energy Spectrum Measurement for DRAGON-I

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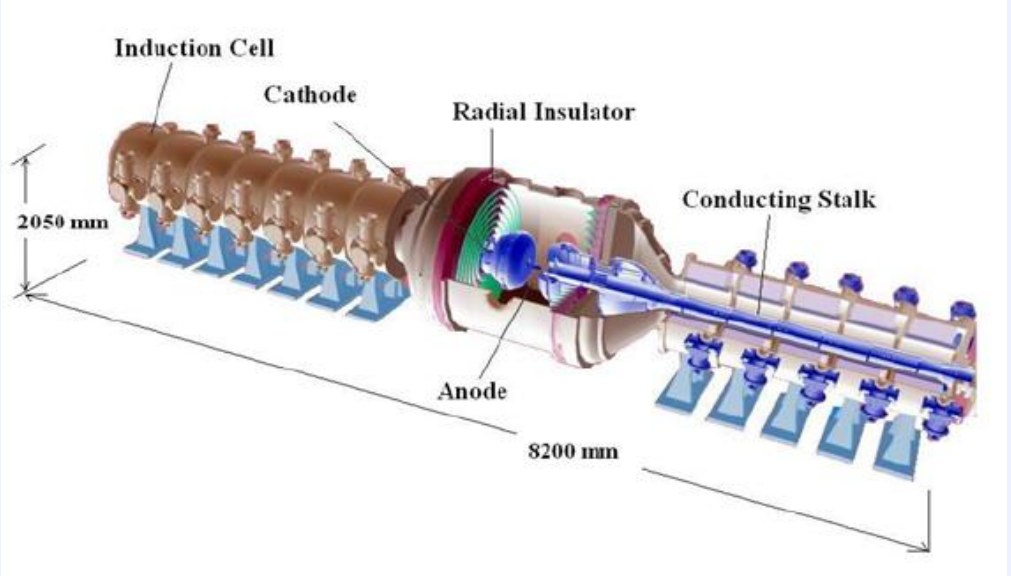
# OUTLINE

- DRAGON-I
- The new method for energy spectrum
  —RBS( Rotating Beam in Solenoid)
- Experimental design
- Experimental result
- Conclusion

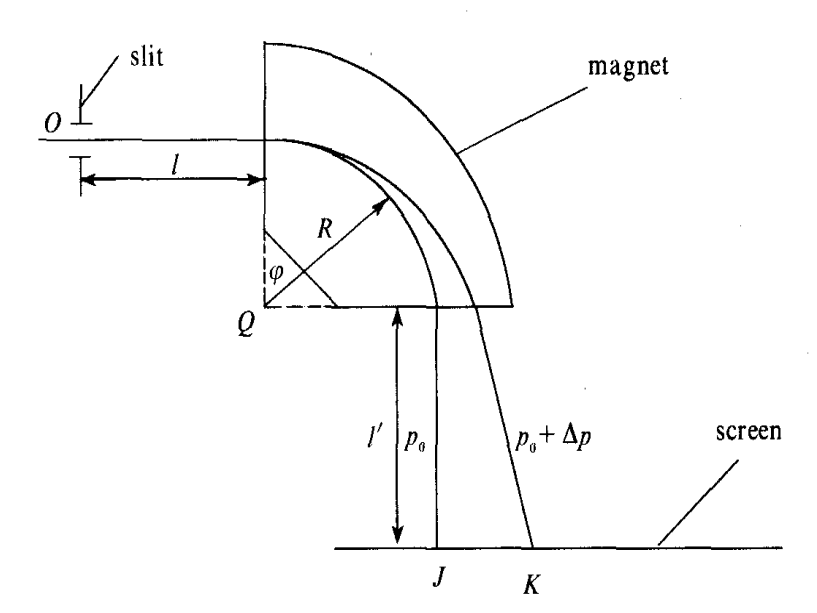
# DRAGON-I

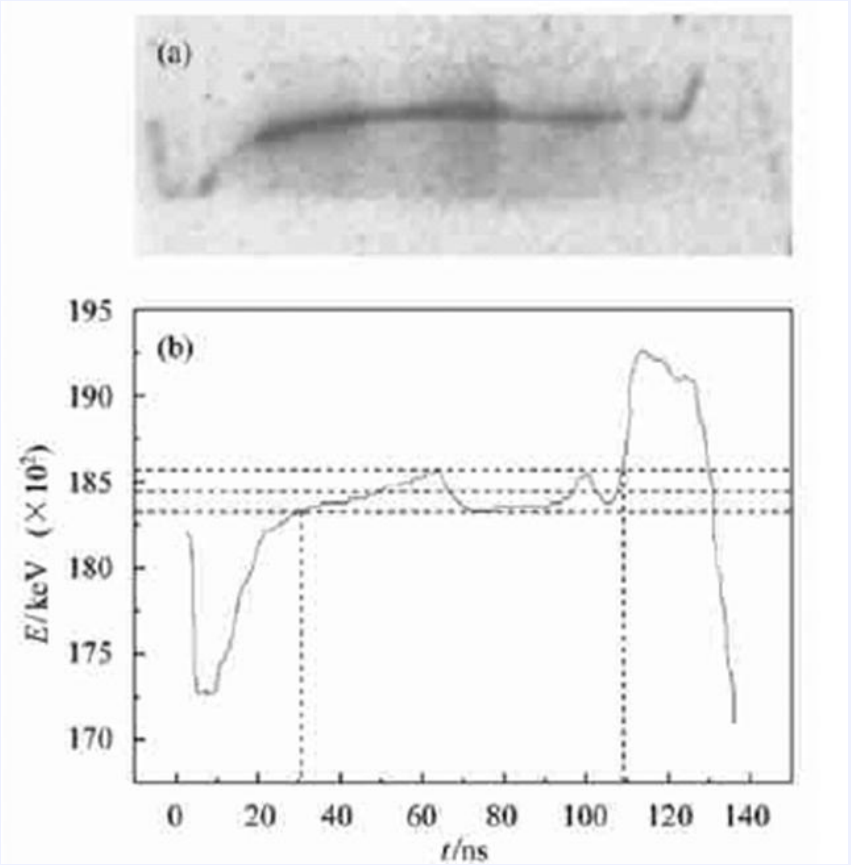
- Injector
- Accelerator cell
- Downstream System




Energy : ~20MeV
Current : ~2.6kA
Pulse : 90ns(FWHM)
Spot : ≤1.5mm(FWHM)

# DRAGON-I




Pulse flattop：

E<18.57MeV

E>18.33MeV

Time-resolved spectrum

# The new method-RBS

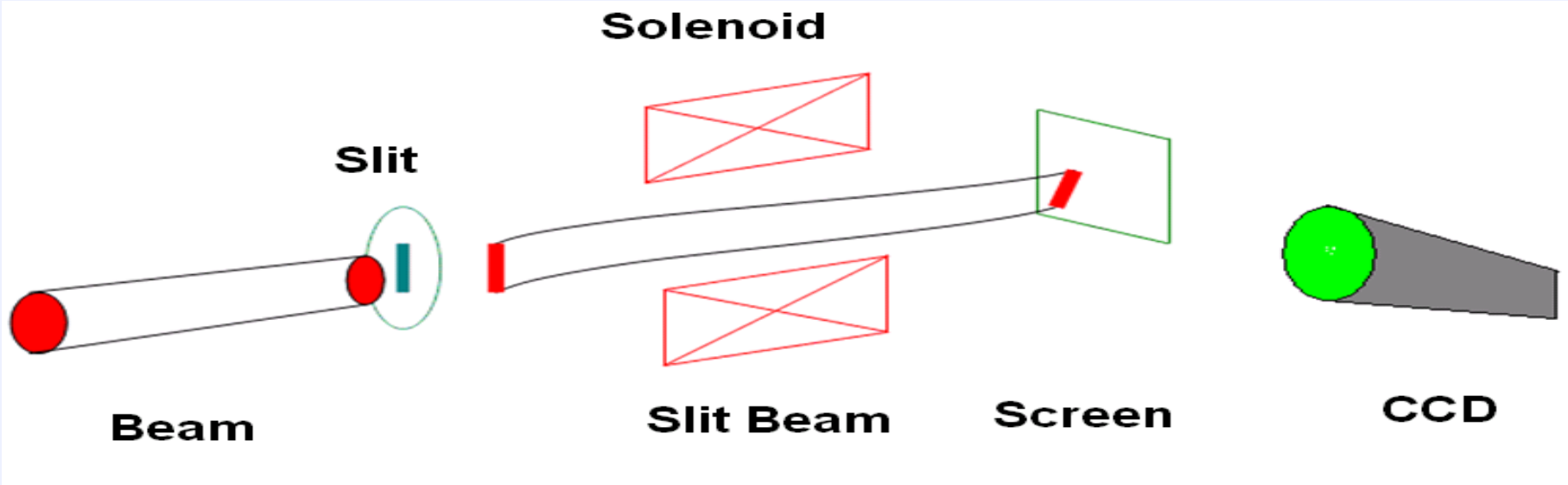
- Bush law

$$\varphi = \frac{e}{2 m_0 c \sqrt{\gamma^2 - 1}} \int_{l_1}^{l_2} B(z)\, dz$$

- RBS-Rotating Beam in Solenoid:

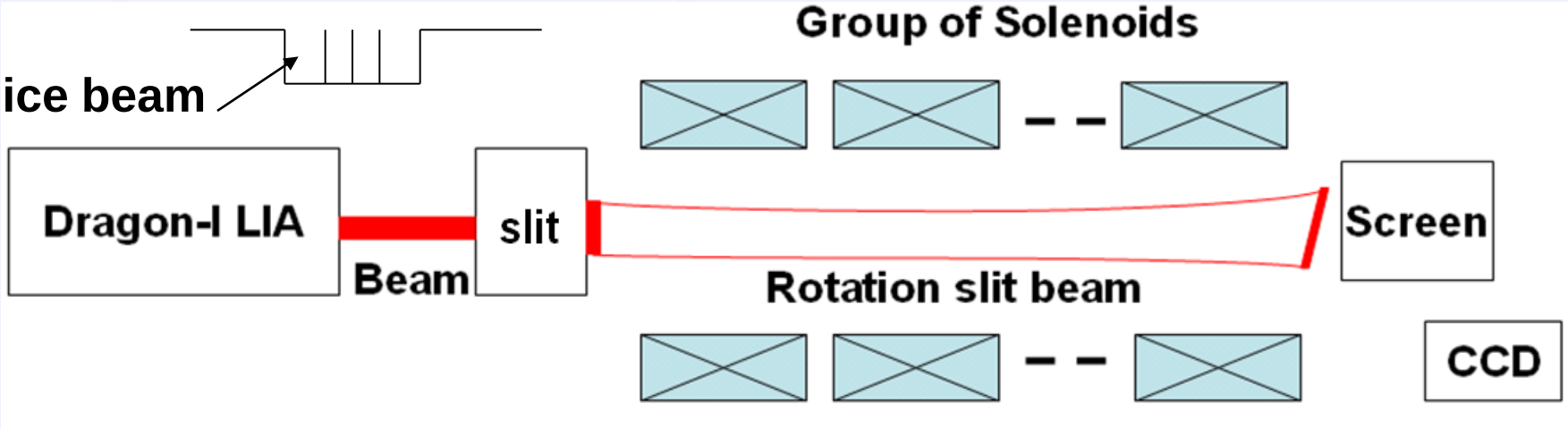
  The beam energy spectrum is determined by measuring the beam rotation angle and its expansion width

# The new method-RBS



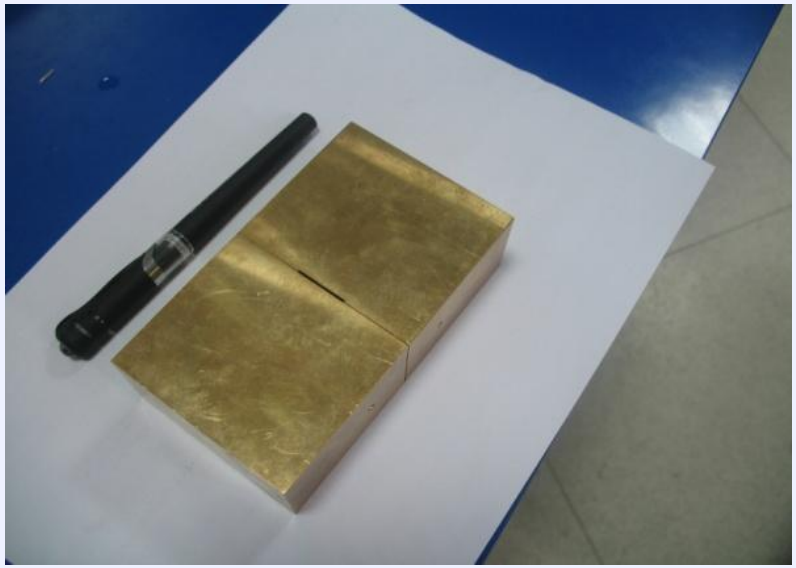

The different energy leads to the different rotation angle in the same transporting solenoids

# Experimental design




- Silt : copper
- Screen: quartz glass

# Experimental design

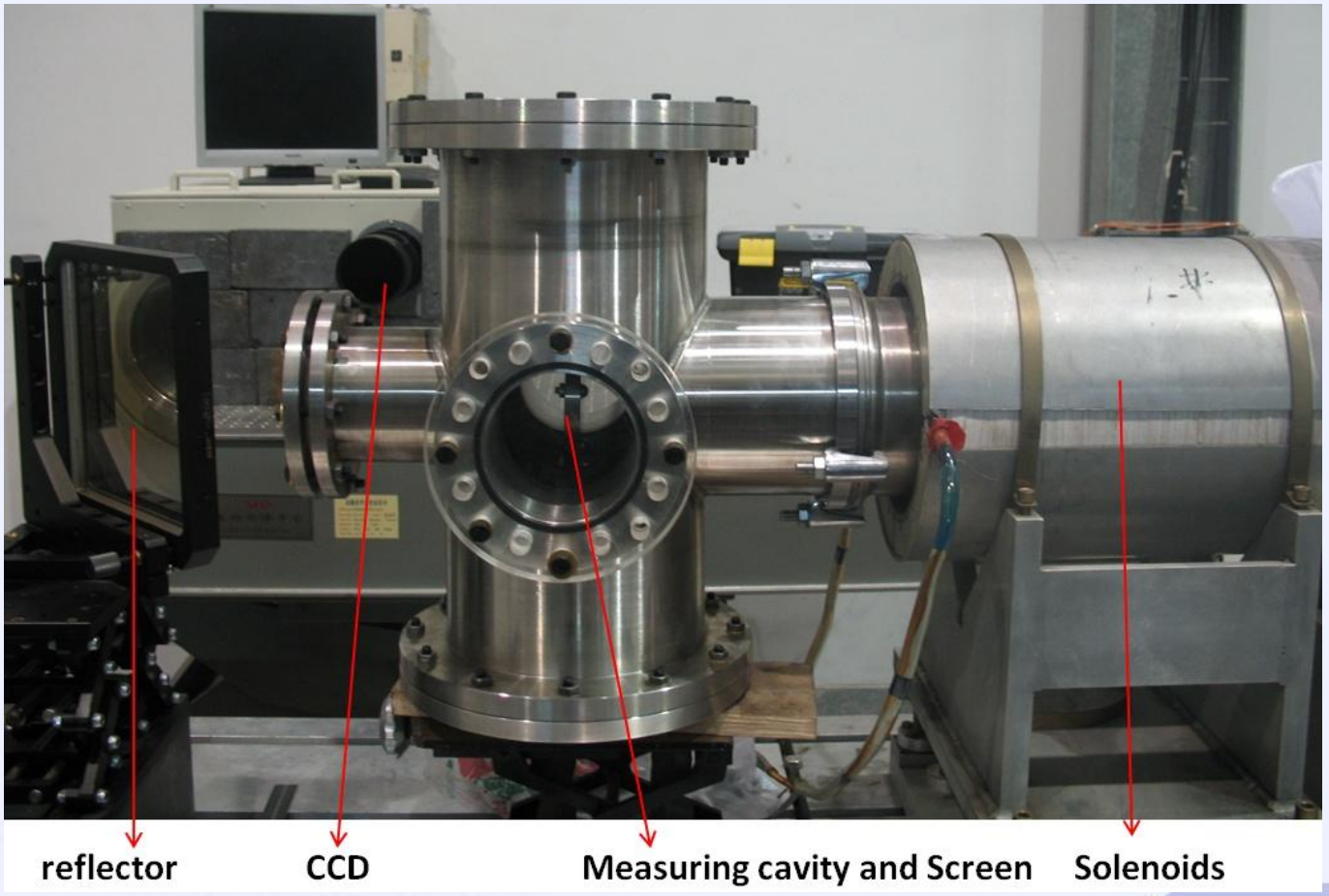


Silt

20mm×0.4mm×40mm

CCD

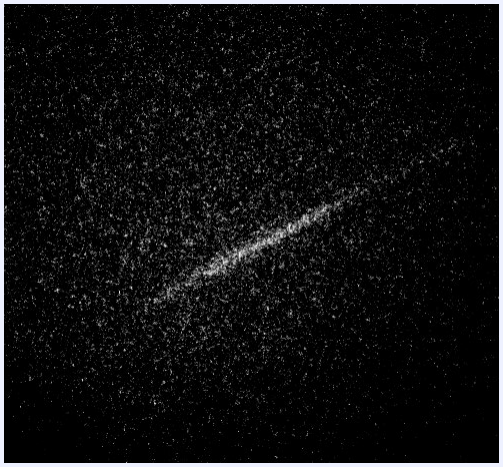
# Experimental design



# Experimental result

CCD works 10ns shutter, 160 plus and the delay time from 95ns to 175ns
The integral magnetic solenoid field is 3250Gs.m

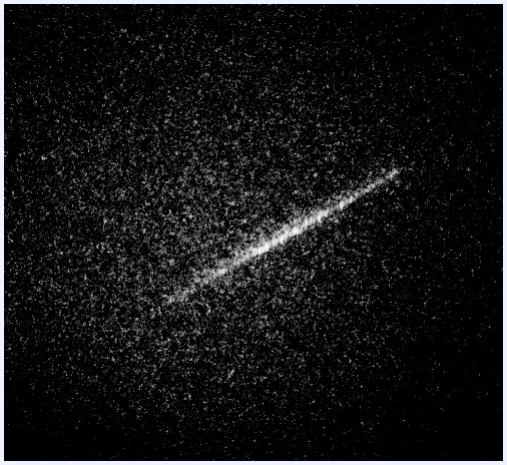
The initial angle is 0 degree



120ns

152.7 degree

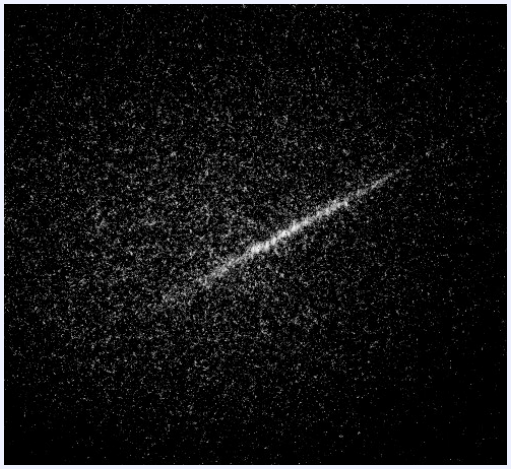
18.25MeV



150ns

151.2 degree

18.45MeV

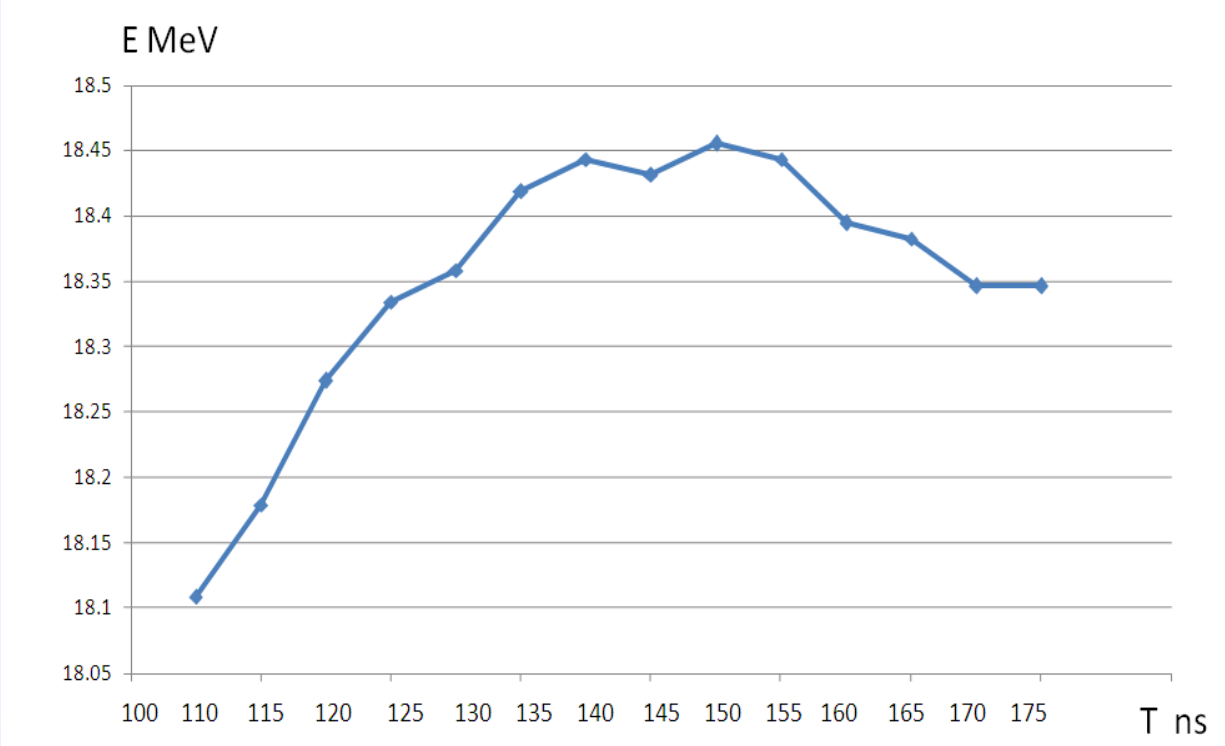


175ns

152.1 degree

18.37MeV

# Experimental result




the time resolved beam energy spectrum for DRAGON-I

# Conclusion

- The time resolved beam energy spectrum for DRAGON-I can be measured with a new method which is named RBS (Rotating Beam in Solenoids)

- The experimental results show that the beam energy at the exit of DRAGON-I is about 18.4MeV and the energy spectrum is less than 2%

# THANKS...