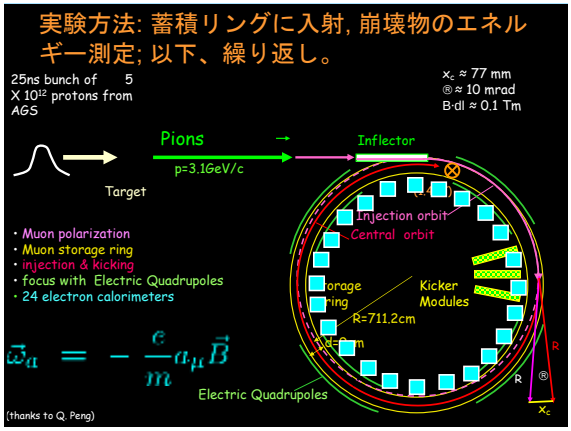
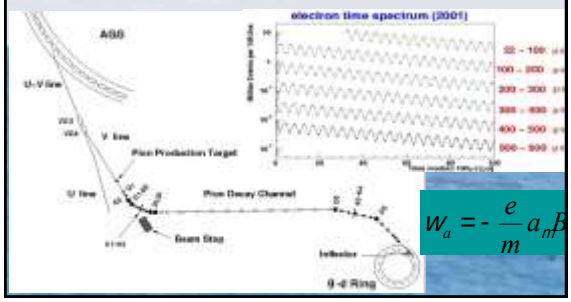


How it is Measured?

- Precession frequency (ω_a) of muon spin in the storage ring is measured;

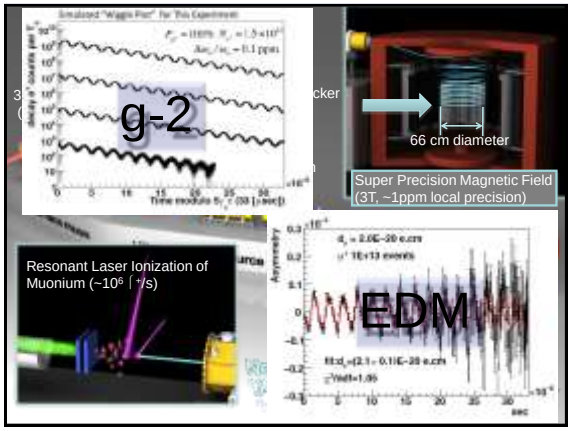


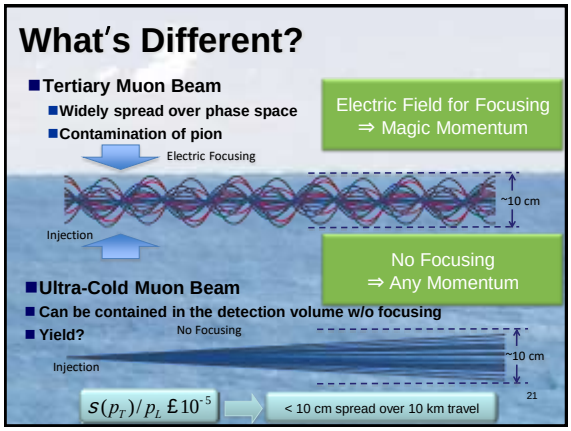
$$w_a = -\frac{e}{m} a_m B$$

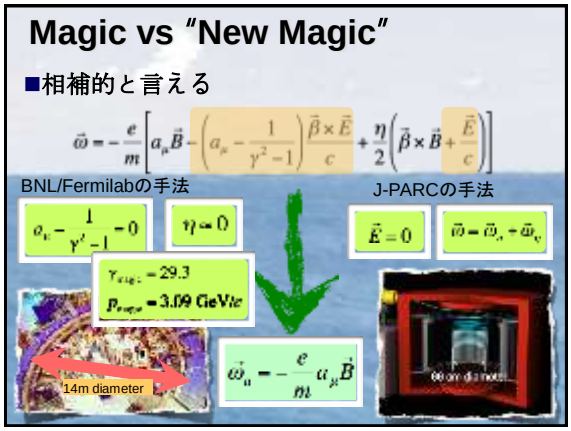
フェルミ研究所で第２の人生

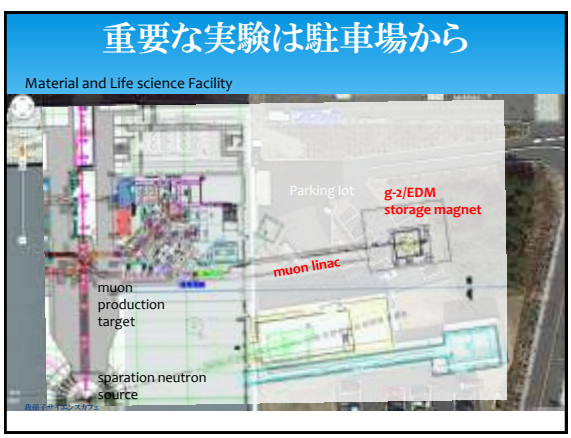
- ニューヨークからシカゴまでリングを輸送
- 2017年から実験開始！


J-PARC Facility
(KEK/JAEA)
LINAC
3 GeV
Synchrotron
Neutrino Beam
To Kamioka
H-Line for
Muon Fundamental Physics


g-2
66 cm diameter
Super Precision Magnetic Field
(3T, ~1ppm local precision)
Resonant Laser Ionization of
Muonium (~10⁶ ⌈⁻/s)
EDM


What's Different?
Tertiary Muon Beam
Widely spread over phase space
Contamination of pion
Electric Field for Focusing
⇒ Magic Momentum
Electric Focusing
~10 cm
Injection
No Focusing
⇒ Any Momentum
Ultra-Cold Muon Beam
Can be contained in the detection volume w/o focusing
Yield?
No Focusing
~10 cm
Injection
$s(p_T)/p_L$ £ 10^{-5}
< 10 cm spread over 10 km travel
21


Magic vs "New Magic"
■相補的と言える
$\vec{\omega} = -\frac{e}{m}\left[a_\mu \vec{B} - \left(a_\mu - \frac{1}{\gamma^2-1}\right)\frac{\vec{\beta}\times\vec{E}}{c} + \frac{\eta}{2}\left(\vec{\beta}\times\vec{B} + \frac{\vec{E}}{c}\right)\right]$
BNL/Fermilabの手法
J-PARCの手法
$a_\mu - \frac{1}{\gamma^2-1} = 0$
$\eta = 0$
$\gamma = 29.3$
$p = 3.09$ GeV/c
$\vec{E} = 0$
$\vec{\omega} = \vec{\omega}_a + \vec{\omega}_c$
14m diameter
$\vec{\omega}_a = -\frac{e}{m} a_\mu \vec{B}$


重要な実験は駐車場から
Material and Life science Facility
Parking lot
g-2/EDM
storage magnet
muon linac
muon
production
target
sparation neutron
source


Muon g-2/EDM at J-PARC