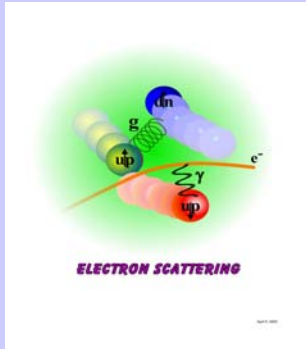


Understanding the Structure of the Proton: Gep-III in Hall C at JLab

(A collaboration involving over 20 institutions from the U.S., Armenia, Canada, France, Italy, and Russia led by The College of William & Mary, JLab, Norfolk State University, and Christopher Newport University)

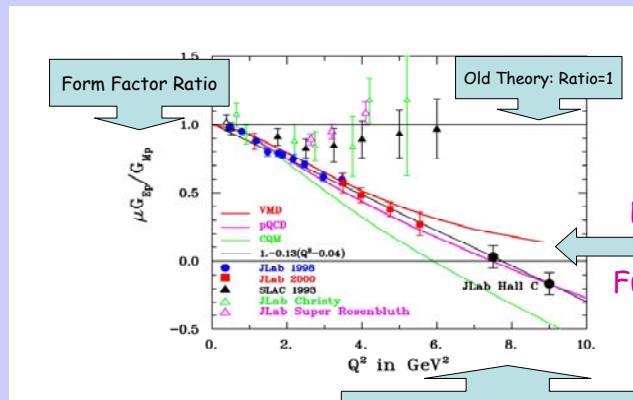


Quantum ChromoDynamics - the fundamental theory that describes proton structure:

- The proton is composed of **quarks and gluons**.
- The moving charged quarks produce electric and magnetic fields.
- There is an intrinsic spin magnetic moment.
- The charge and current distributions inside the proton are probed using the virtual photons of **ELECTRON SCATTERING**.
- We measure "**form factors**", which give direct information on the *spatial distribution* of charge and current inside the proton

G_{Ep} - The **Electric Form Factor**
- related to the *charge* distribution

G_{Mp} - The **Magnetic Form Factor**
- related to the *current* distribution

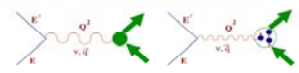


Four-Momentum Transfer:
Probing smaller structures with larger Q^2

Wave length of the virtual photon:

$$\lambda = h/q = h/\sqrt{Q^2}$$

Higher $Q^2 \Rightarrow$ Higher resolution

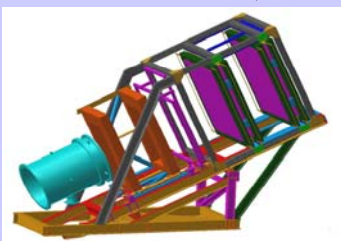


Gep-III: Recoil Polarization in Elastic Electron Scattering From Hydrogen - $p(\vec{e}, e' \vec{p})$

Incoming
Polarized
Electrons:
 $E = 6 \text{ GeV}$

Scattered
Polarized
Proton

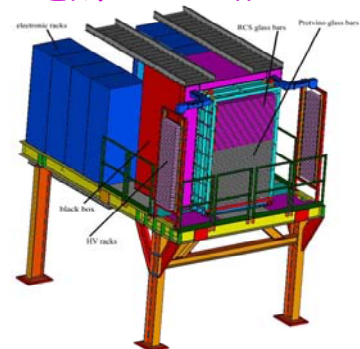
Scattered
Electron



**A New
Focal Plane
Polarimeter**

(Laboratory for High Energy,
JINR, Dubna, Russia)

**BigCal - A New
Lead Glass
EM Calorimeter**



(Institute for High Energy Physics,
Protvino, Russia &
Yerevan Physics Institute, Armenia)