UNIVERSITÀ DEGLI STUDI DI FERRARA
- EX LABORE FRUCTUS -

INFN
Istituto Nazionale di Fisica Nucleare

La Fisica dello Spin: i progetti EDM e CLAS12

Lavori in corso a Fisica, 29 Gennaio 2021

Spin Group

Responsabili progetto: prof. Paolo Lenisa, dr. Marco Contalbrigo

Staff: prof. Ciullo Giuseppe, prof. Luciano Pappalardo,
prof. Federico Spizzo, prof. Lucia del Bianco

Post-docs: dr. Sergey Dymov, dr. Andrea Pesce,
dr. Luca Barion

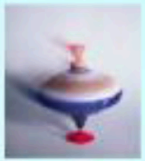
Dottorandi: Anton Kononov, Nicola Canale, Rahul Shankar,
Simone Vallarino

Spin Group : focus

- Studio dello spin del protone
- Studio delle simmetrie fondamentali
- Tecnologie della polarizzazione

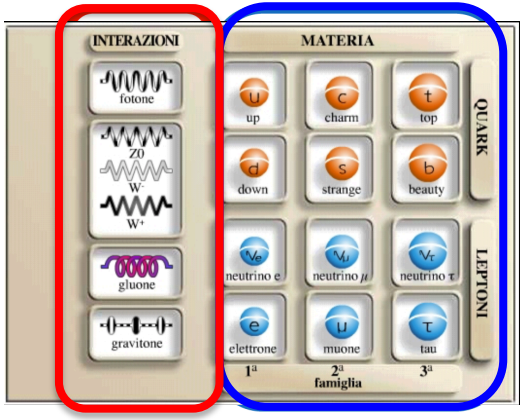
Studio dello spin del protone

Fisica classica:
rotazione di un oggetto intorno al proprio asse
(trottola, pianeti, stelle, galassie,...)



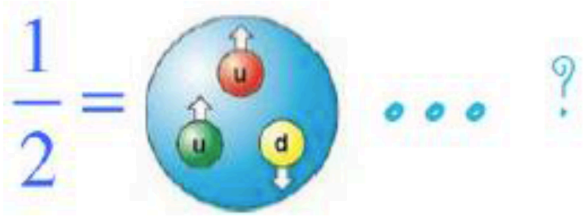
Fisica quantistica:
- è una proprietà fondamentale di tutte le particelle
- ha le caratteristiche di un momento angolare
- conferisce proprietà magnetiche alle particelle (momento magnetico)
- definisce la natura (fermione o bosone) delle particelle:

W.Pauli and N.Bohr

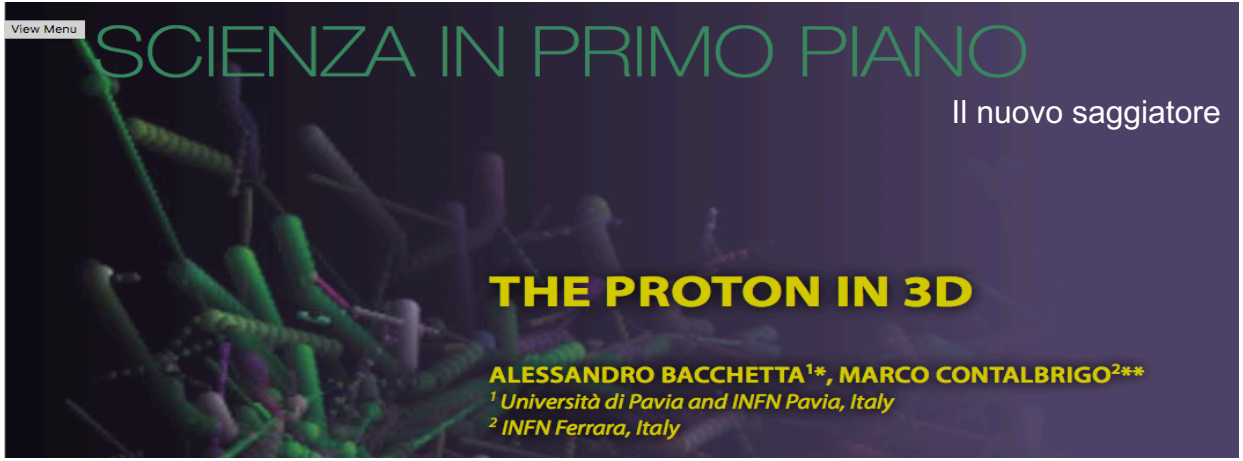


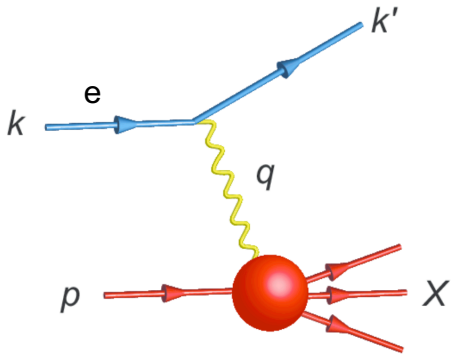
Fermioni: spin semi-intero
Fermi-Dirac

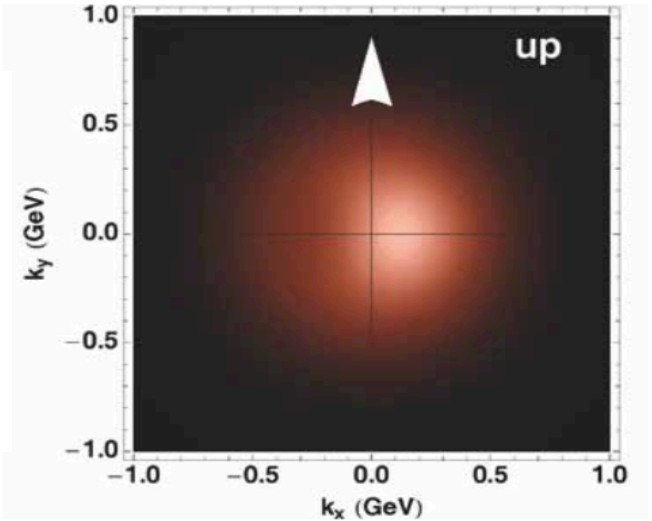
Bosoni: spin intero
Bose-Einstein

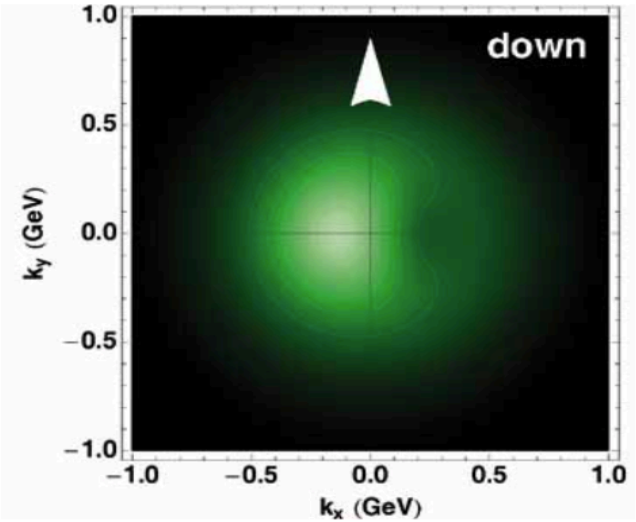


Studio dello spin del protone



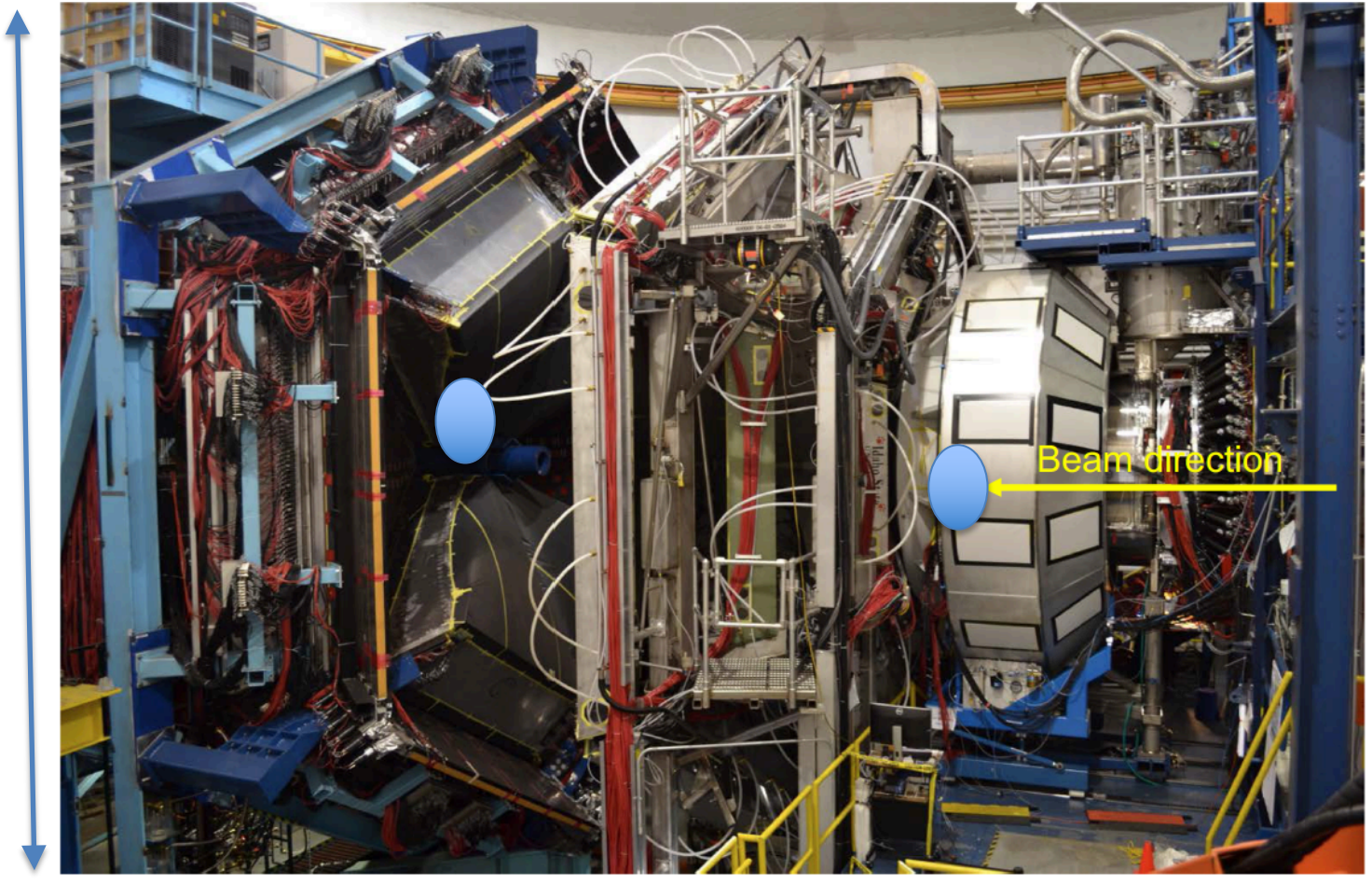






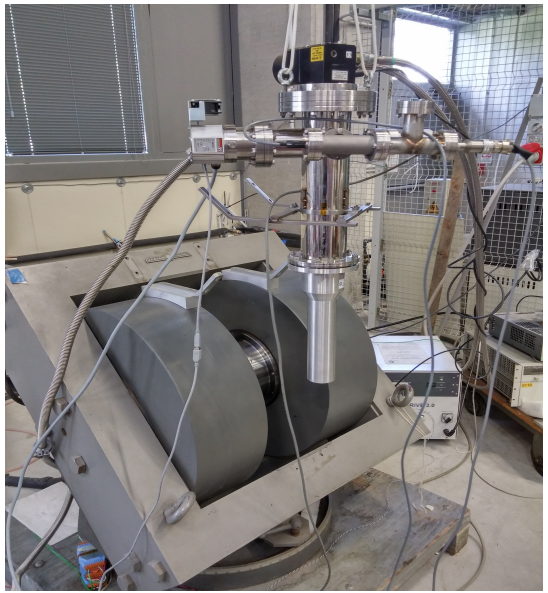
Studio dello spin del protone

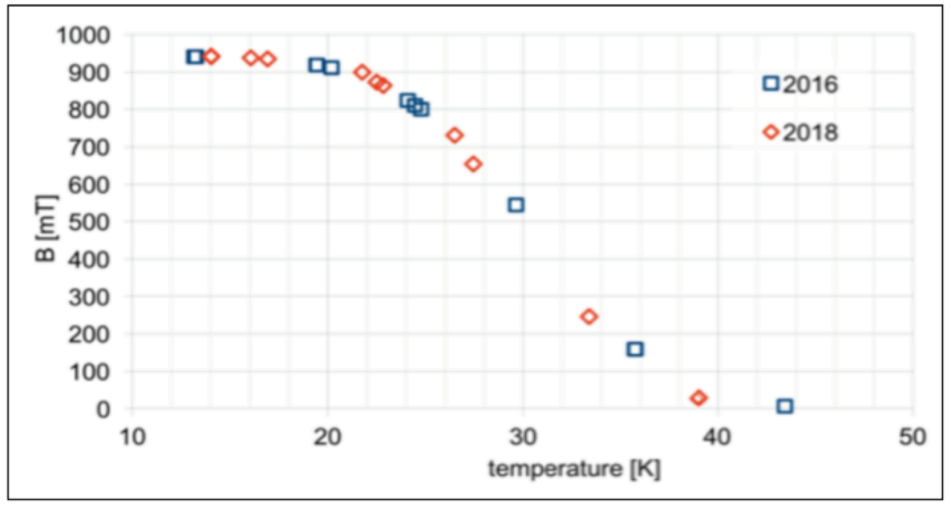
L'esperimento CLAS12 al Jefferson Lab, VA - USA

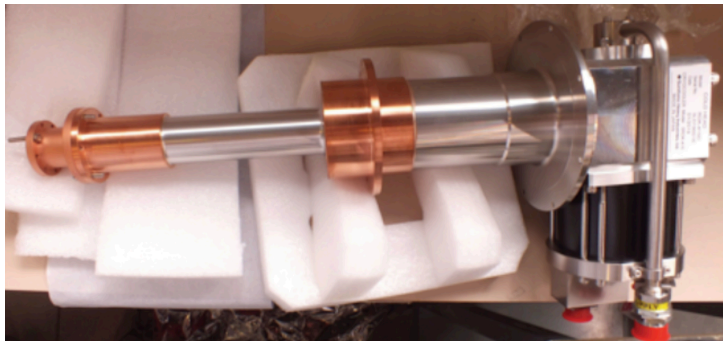


Studio dello spin del protone

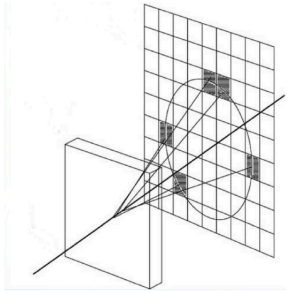
Cilindri di superconduttore per intrappolare campi magnetici polarizzanti





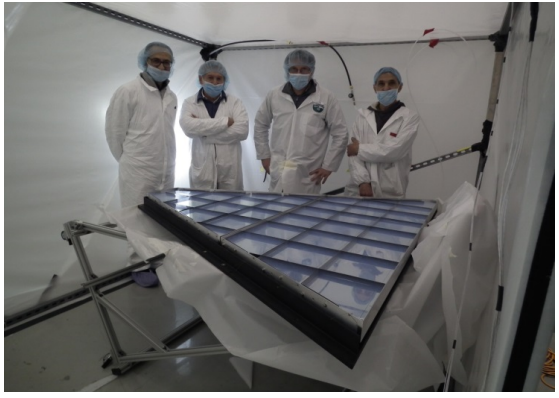


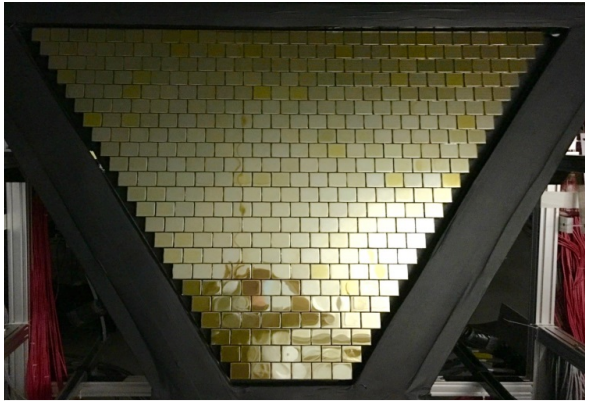
Studio dello spin del protone



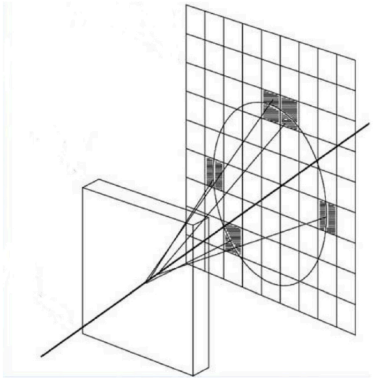
Rivelatori Cherenkov ad immagine

per identificare particelle e il sapore dei quark interagenti



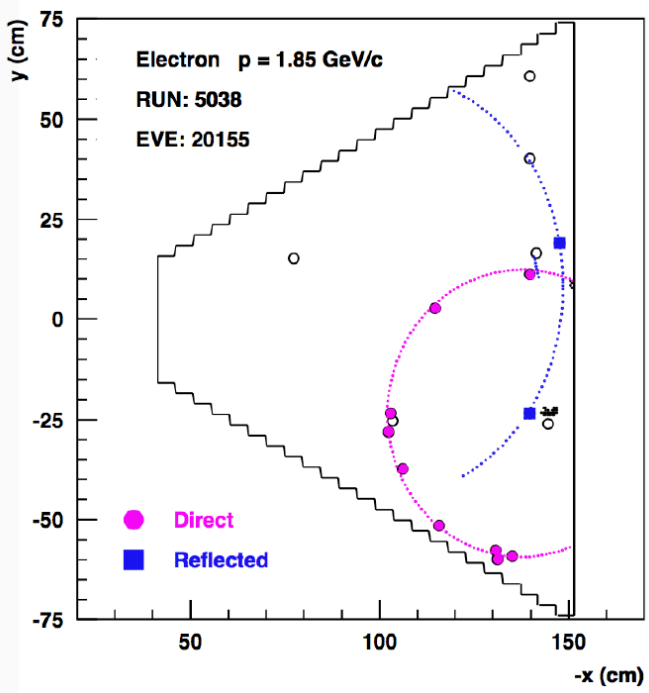


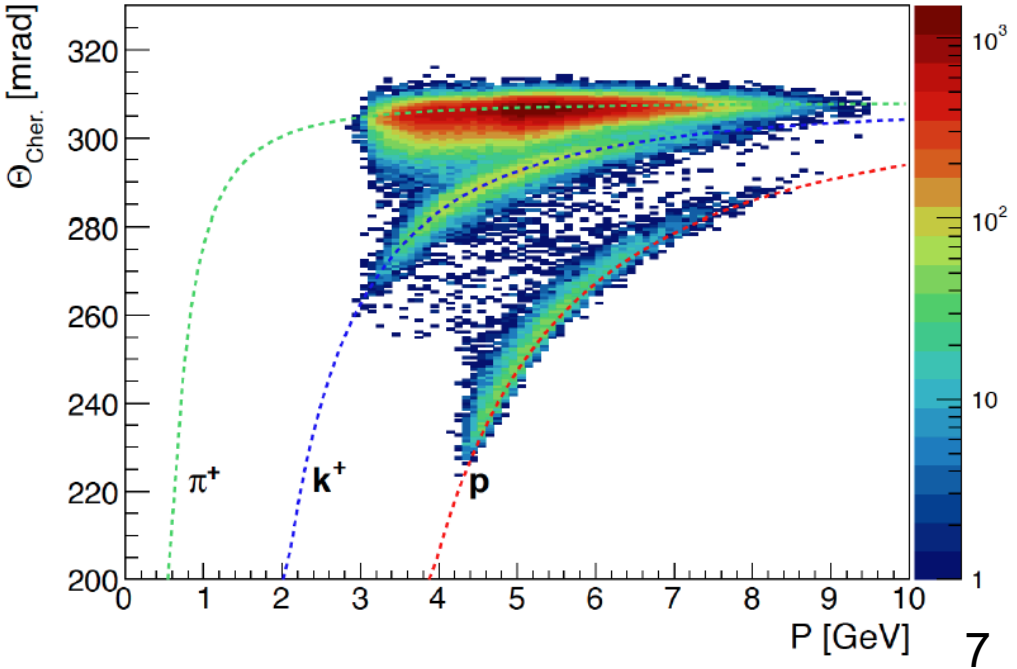
Studio dello spin del protone



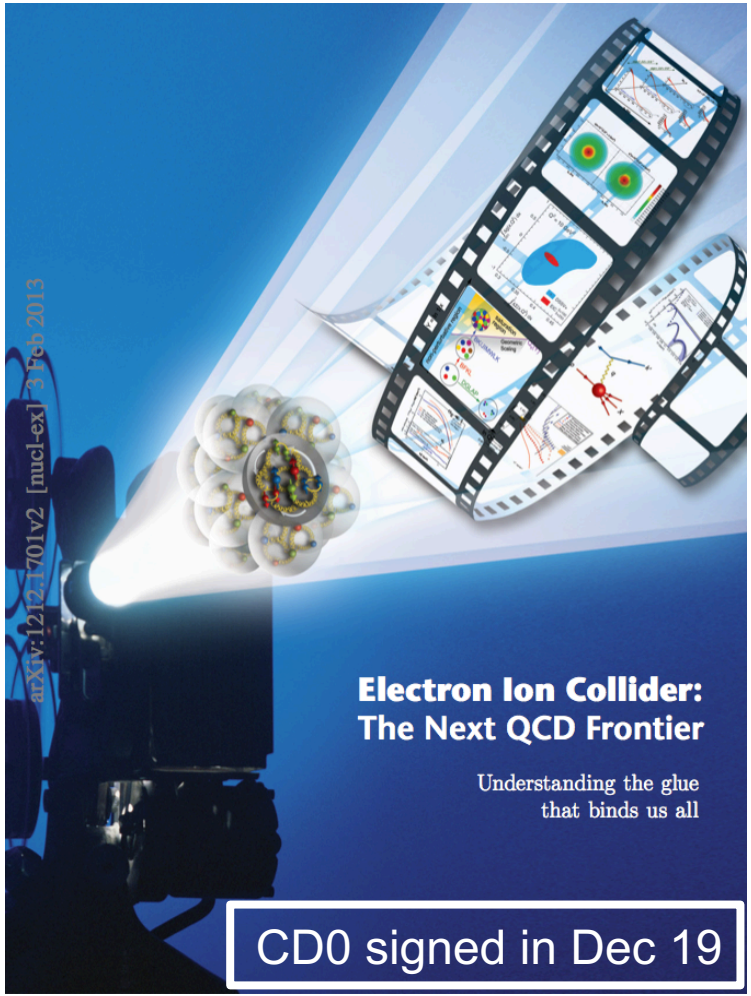
Rivelatori Cherenkov ad immagine
per identificare particelle e dedurne il sapore dei quark interagenti

RICH1 in uso, RICH2 in costruzione



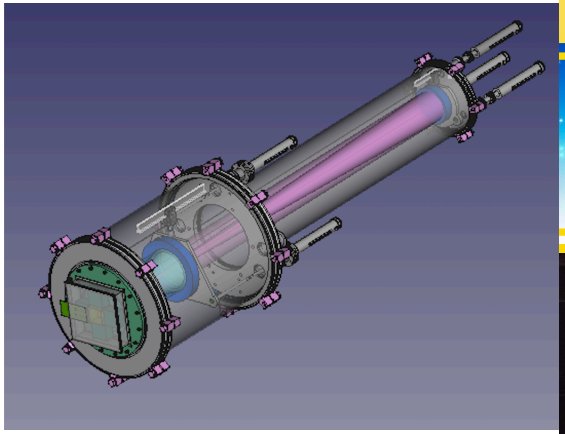


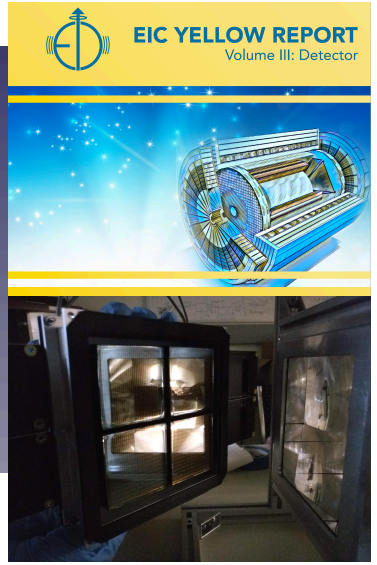
Studio dello spin del protone



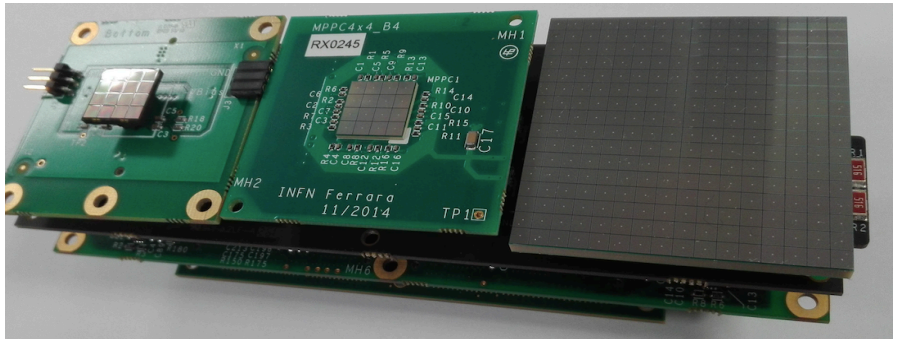
CD0 signed in Dec 19

Nuova generazione di rivelatori Cherenkov





Soluzioni per applicazioni



Studio delle simmetrie fondamentali

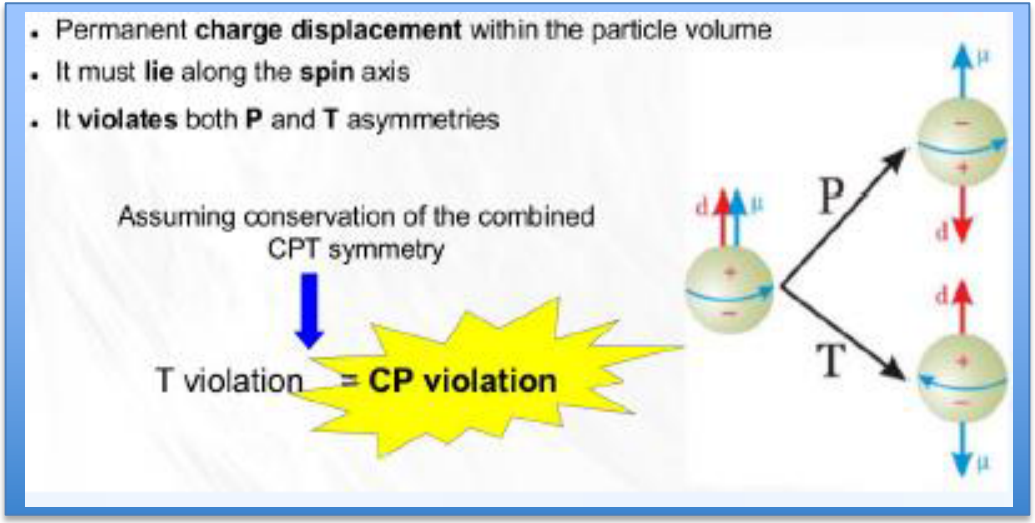
*Electric Dipole Moments **EDM** e la ricerca dell'origine della materia*

MATTER DOMINATED UNIVERSE

Baryon-to-photon ration n_b/n_γ

Observed **$6.19(15)\times10^{-10}$** SM expectation **$\sim10^{-18}$**

PDG July 2012



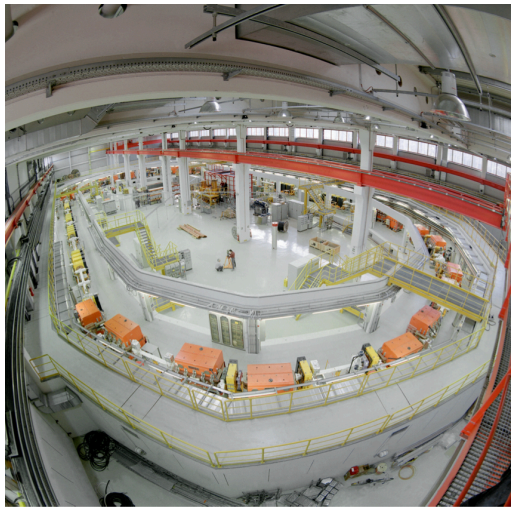
Studio delle simmetrie fondamentali

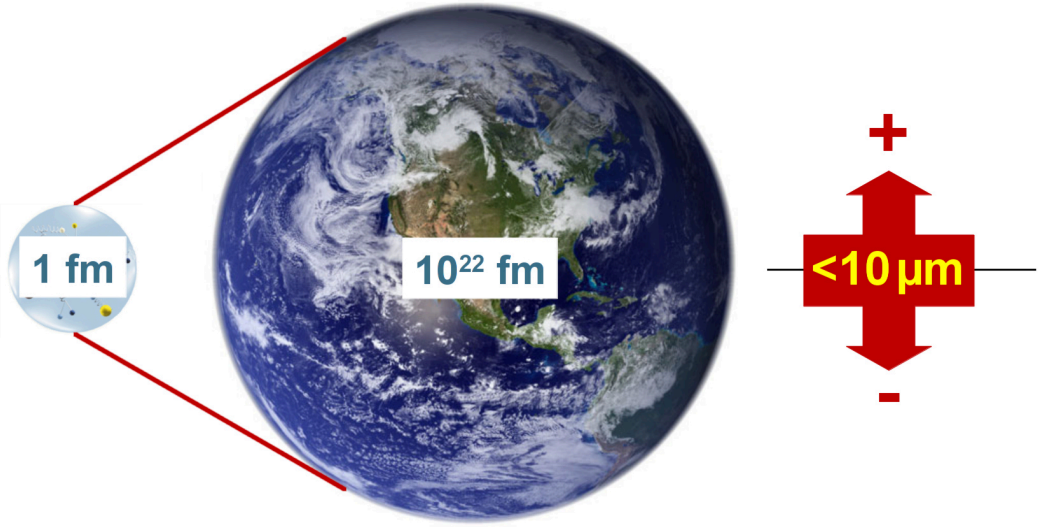
ERC Advanced Grant

JEDI

Storage rings steps up search for electric dipole moments

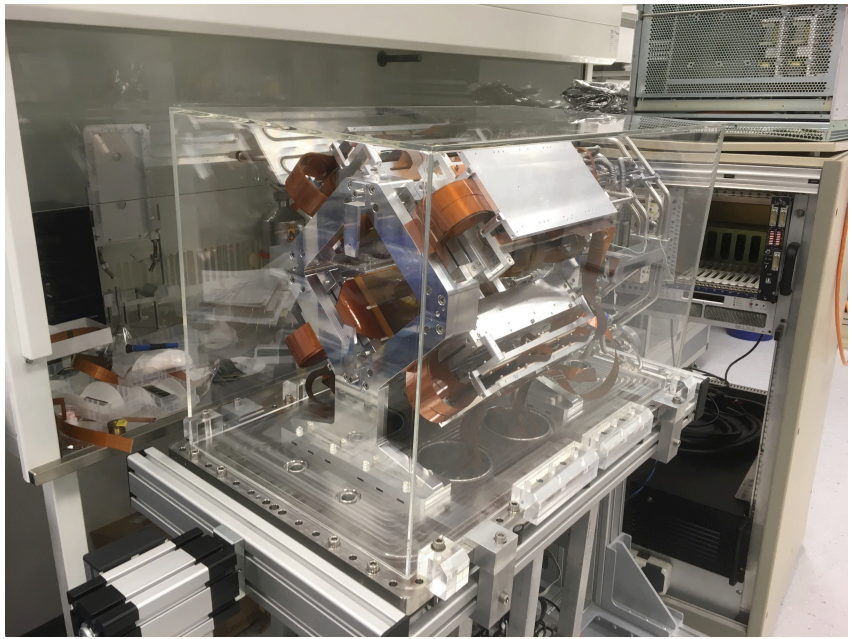
World record in spin tune and phase control

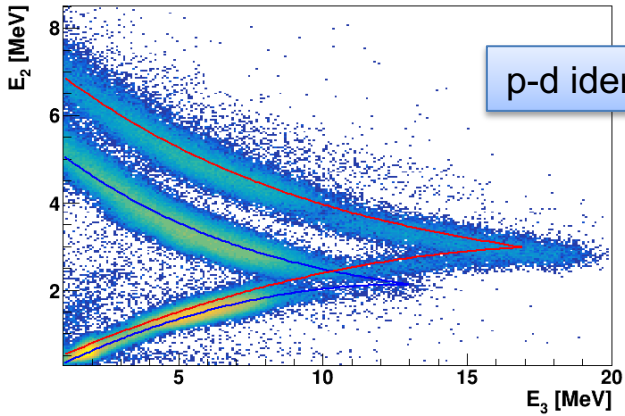


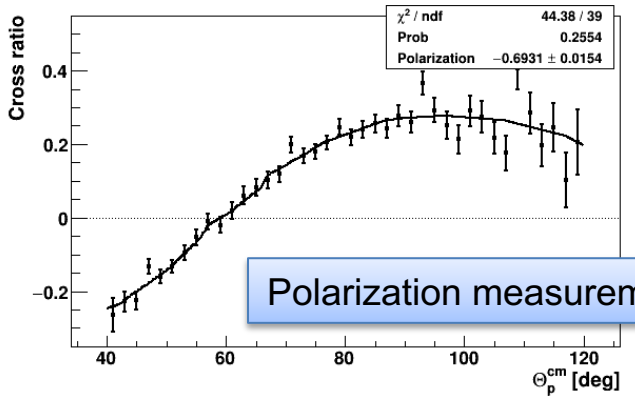


Studio delle simmetrie fondamentali

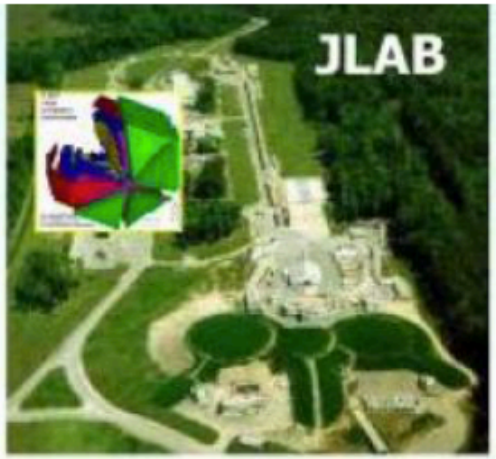
Polarimetria iper-sensibile per individuare gli effetti EDM







Spin Towns



COoler SYnchrotron

Jefferson Lab

Proposte di tesi

Sviluppo di rivelatori a semiconduttore per progetti @ COSY

Sviluppo di rivelatori Cherenkov per progetti @ JLab e EIC

Fisica degli acceleratori: tecnologie per fasci e bersagli

Analisi dati per lo studio di interazioni fondamentali nei processi di scattering tra fasci e bersagli polarizzati

Contatti

Paolo Lenisa
Stanza C206, lenisa@fe.infn.it

EDM experiment
http://www.fz-juelich.de/ikp

Marco Contalbrigo
Stanza C208: contalbrigo@fe.infn.it

CLAS12 experiment
https://www.jlab.org/physics/hall-b