

COMET

(Biennale du LPNHE, Village du PréBas, 28-31 mai 2024)

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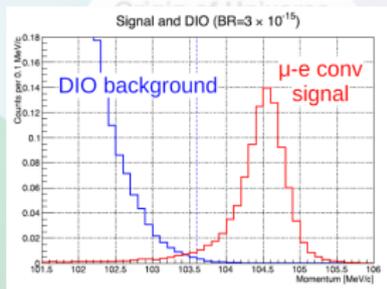
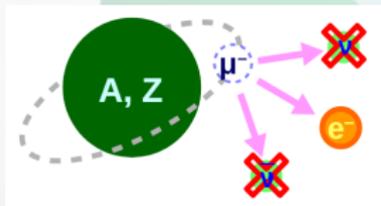


LAC CHAMBON = AUVERGNE

L'expérience COMET au Japon/J-PARC

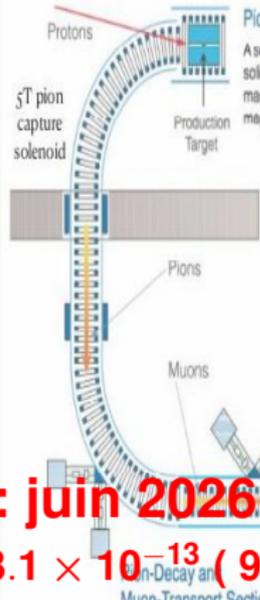
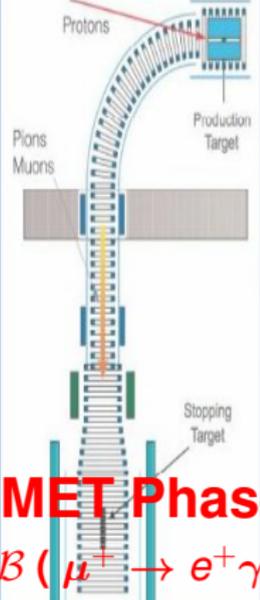
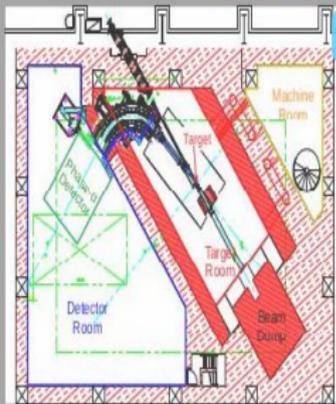
(COherent Muon to Electron Transition)

Recherche de désintégration sans émission de neutrino (CLFV)



- COMET : 300 chercheurs, 17 pays, 48 laboratoires.
- COMET-France : 8 chercheurs (LPNHE, LPC-Clermont, LPC-Caen et IP2I-Lyon)
- COMET-LPNHE : Wilfrid da Silva (plein temps), Luigi del Buono (temps partiel) et Patricia Warin-Charpentier (gestion des comptes COMET au CC-IN2P3)

COMET (une stratégie en trois phases)



Pion Capture Section
 A section to capture pions with a large solid angle under a high solenoidal magnetic field by superconducting magnet

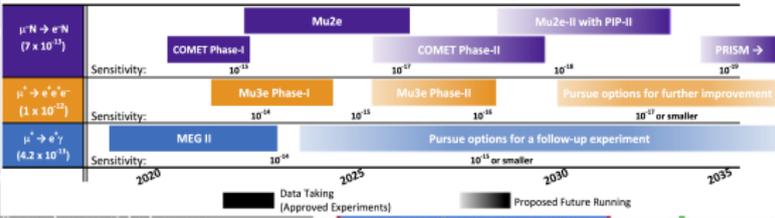
8 GeV proton beam (56 kW)
 Tungsten proton target
 1.2 10¹³ stopped muons/s

Detector Section
 A detector to search for muon-to-electron conversion processes.

Début de COMET Phase I : juin 2026 !

- MEG II (2024 !) : $B(\mu^+ \rightarrow e^+ \gamma) < 3.1 \times 10^{-13}$ (90% C.L.)

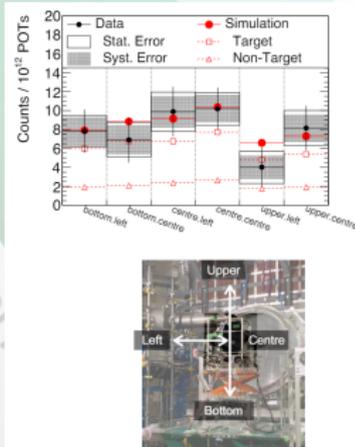
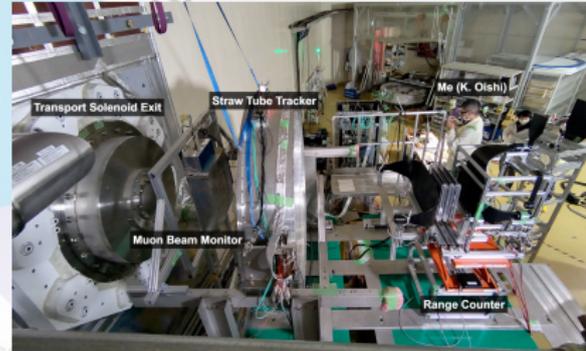
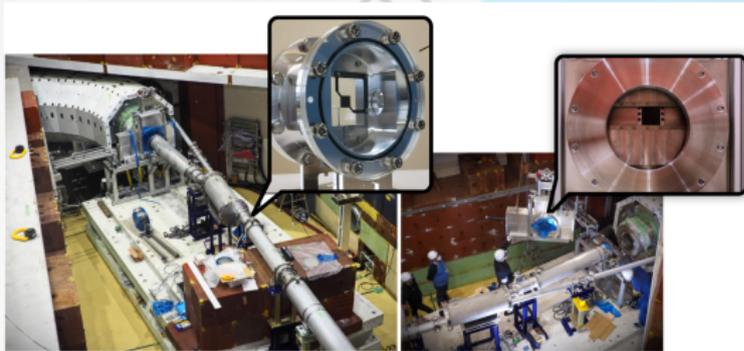
Searches for Charged-Lepton Flavor Violation in Experiments using Intense Muon Beams



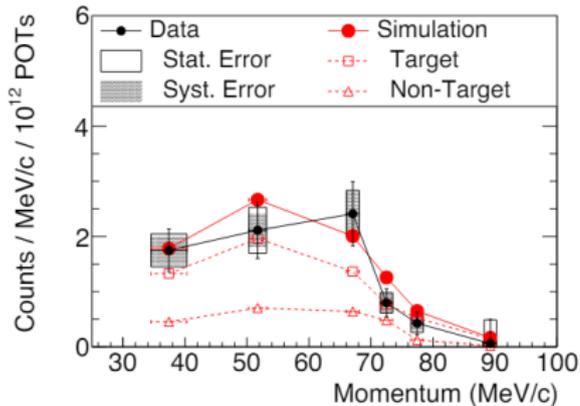
Muon-Transport Section
 A section to collect muons from decay of pions under a solenoidal magnetic field.

5 m
 Expected limit : $7 \cdot 10^{-7}$ @ 90% CL
 Total background : 0.32 events
 Running time : 1.5 (2.1) a

Phase α : étude du faisceau de muons

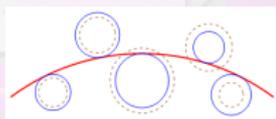


Unification of Forces

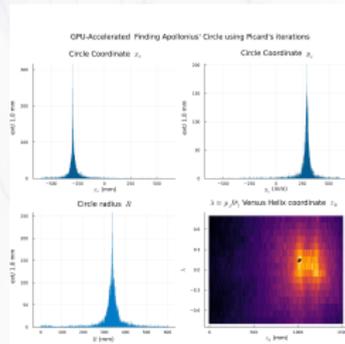
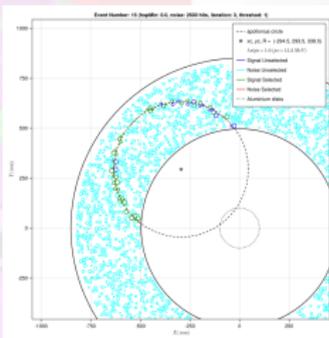


Le problème d'Apollonius appliqué à une chambre à dérives stéréo (arXiv:2401.04576)

$$(x_i - x_c)^2 + (y_i - y_c)^2 - (R + r_i(d_j, z_0, \lambda, \dots))^2 = 0$$



- Transformée de Hough et l'arithmétique d'intervalle avec Julia
- Méthode de point fixe sur GPU
- Apprentissage automatique en combinaison avec l'optimisation combinatoire



COMET : passage au conseil scientifique de l'IN2P3 du 24 juin

Merci de votre attention !