



Canadian Association  
of Physicists

Association canadienne  
des physiciens et physiciennes

Contribution ID: 3905

Type: **Invited Speaker / Conférencier(ère) invité(e)**

## (I) PIONEER: a next generation pion decay experiment

*Tuesday, June 20, 2023 4:15 PM (30 minutes)*

Measurement of the charged-pion branching ratio to electrons versus muons,  $R_{e/\mu}$ , is extremely sensitive to a wide variety of new physics effects. The precision of the SM prediction for  $R_{e/\mu}$  is  $\sim 1$  part in  $10^4$ , 15 times more precise than the current experimental result. A next-generation experiment, PIONEER, is aiming at reducing the precision gap between theory and experiment, testing lepton flavor universality at an unprecedented level and probing new physics mass scales up to the PeV range. Additionally PIONEER is aiming at a 3 to 10-fold improvement in the pion beta decay,  $\pi^+ \rightarrow \pi^0 e^+ \nu(\gamma)$  measurement which determines  $|V_{ud}|$  in a theoretically pristine manner. This measurement would shed new lights on existing tensions in the CKM matrix unitarity. PIONEER will use a combination of new detector technologies based on LGAD silicon tracking target, a deep, and high solid angle coverage LXe calorimeter featuring excellent energy and time resolution. I'll discuss PIONEER's detector concept and goals in light of previous experimental designs and achievements.

### Keyword-1

pion decay

### Keyword-2

Lepton Flavour Universality

### Keyword-3

**Primary author:** MALBRUNOT, Chloe (CERN)

**Presenter:** BRUNNER, Thomas (McGill University)

**Session Classification:** (PPD) T4-3 Discovering New Paths to Discovery: New Technologies and Methods to Uncover BSM Physics Symposium | Symposium sur les nouvelles technologies et méthodes pour découvrir la physique au delà du modèle standard (PPD)

**Track Classification:** Symposia Day (Tues. June 20) / Journée de symposiums (mardi, le 20 juin): Symposia Day (PPD - PPD) - Discovering New Paths to Discovery: New Technologies and Methods to Uncover BSM Physics | Découvrir de nouvelles voies vers la découverte : Nouvelles technologies et méthodes pour découvrir la physique au-delà du modèle standard