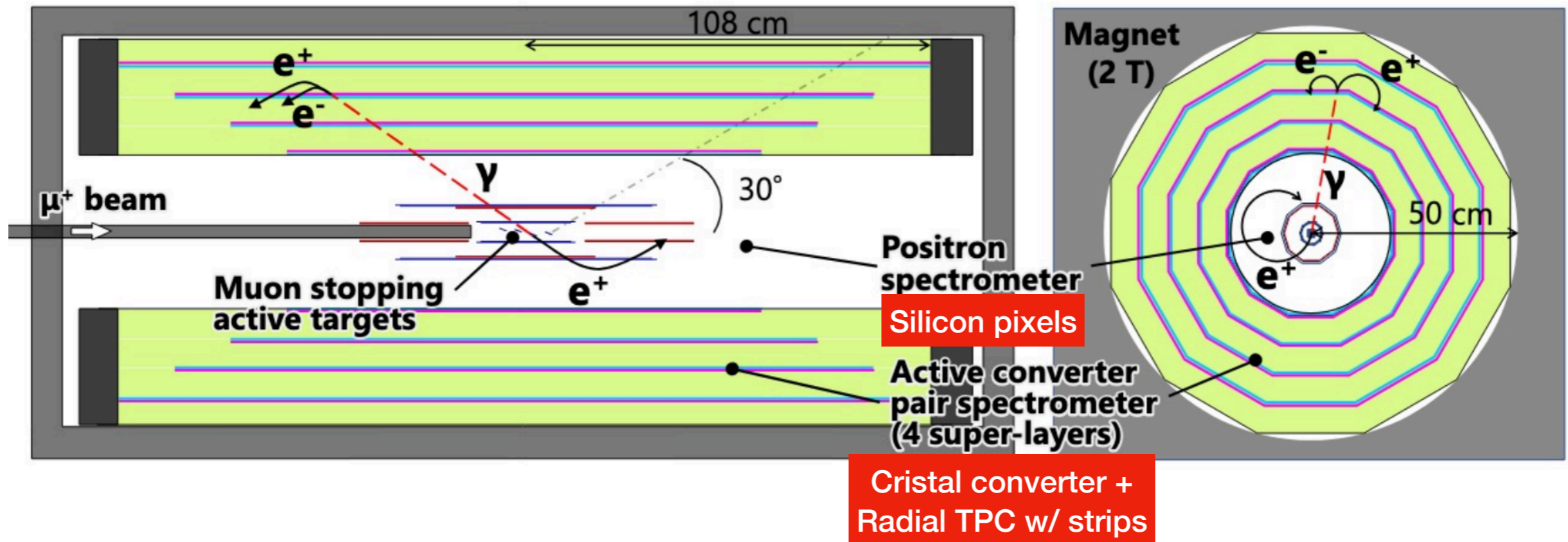


# **Introduction and news**

**Francesco Renga**

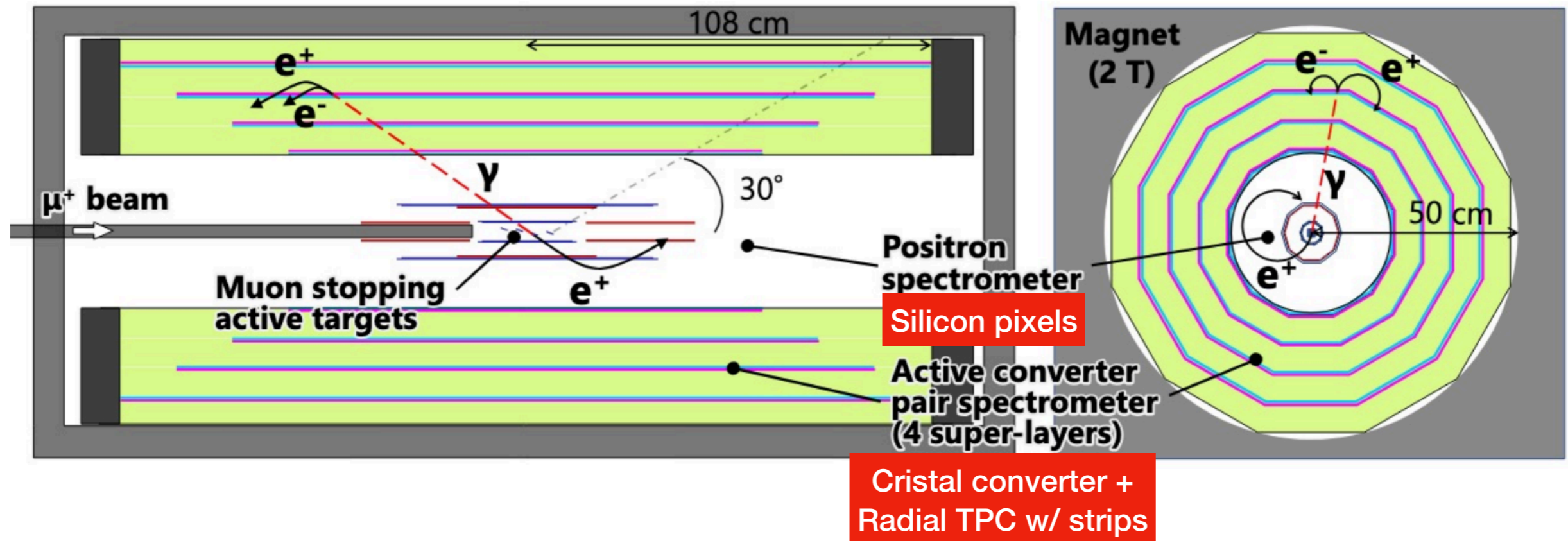
# Toward a baseline detector configuration



- Main missing items:

- positron timing  $\rightarrow$  first thoughts about a scintillator-based solution
- magnetic field configuration (constant vs. gradient)
- target (multiple? active?)
- a credible timeline

# Toward a baseline detector configuration



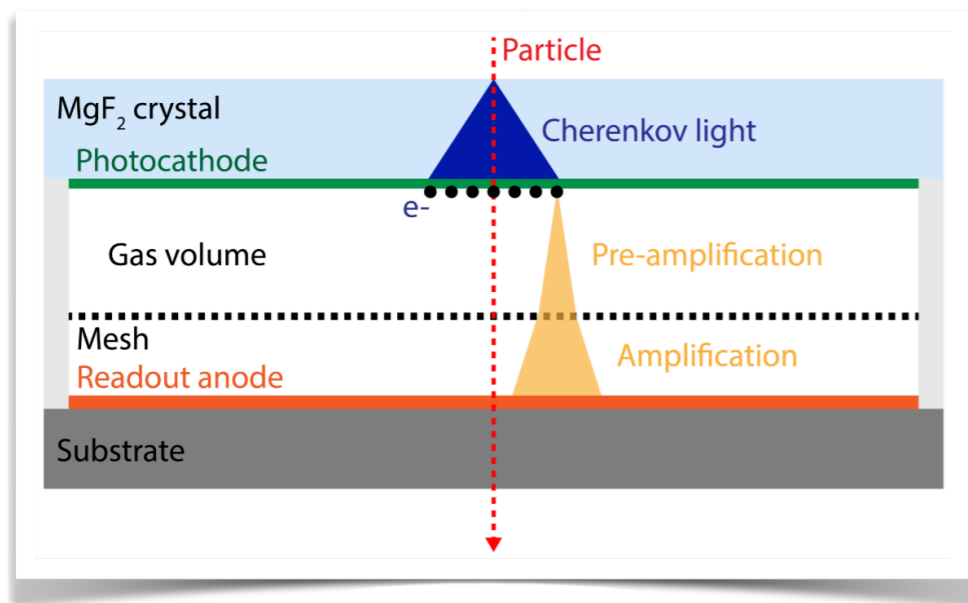
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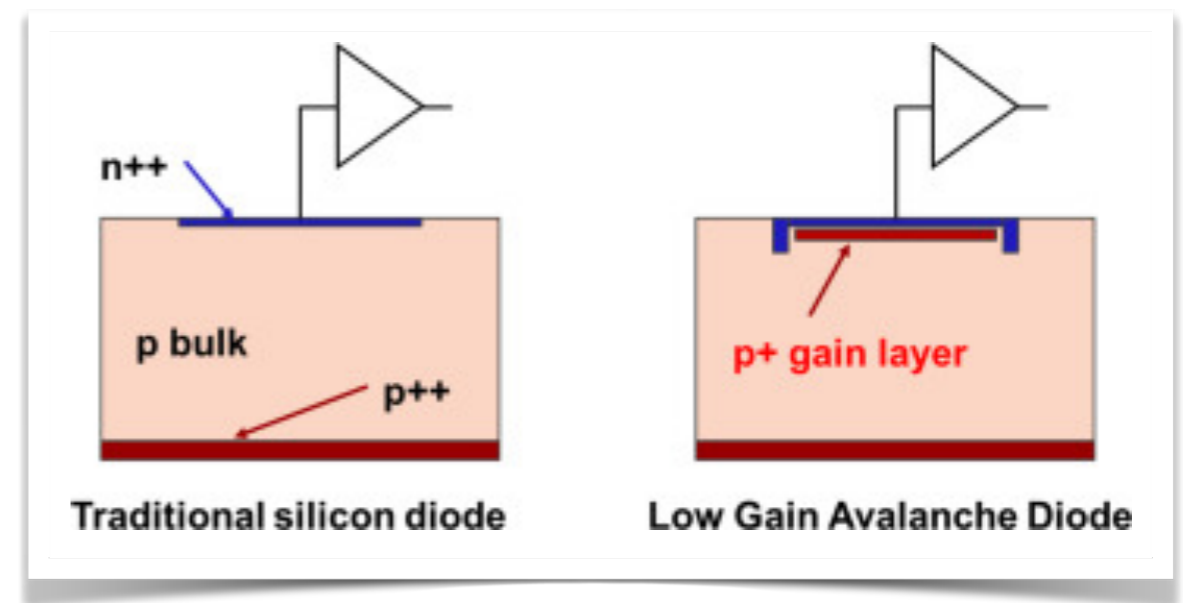
# Beyond the baseline

## Collection of random ideas from some informal discussions

- Alternative solutions for positron tracking:
  - gaseous detector (radial TPC with pad readout)
- Alternative solutions for positron timing:
  - Fast gaseous detectors (PICOSEC)
  - Low Gain Avalanche Diodes (LGAD)



Possible interest from LIP (Lisbon)

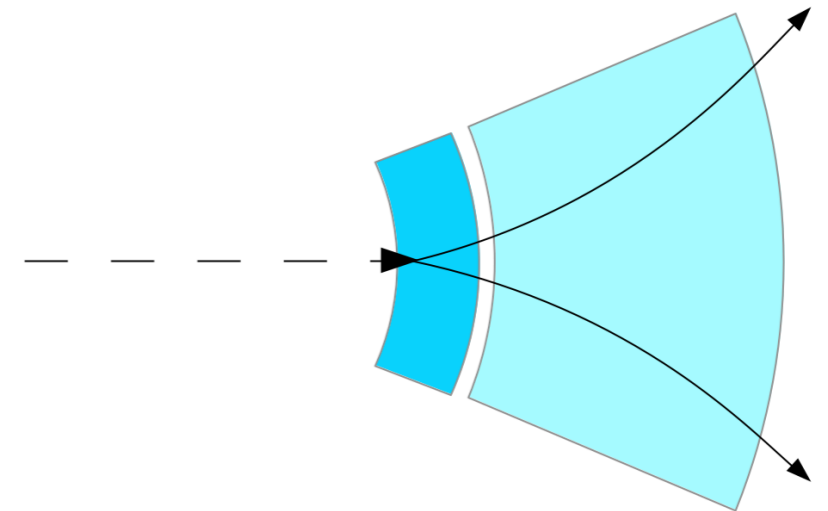


Some expertise in Genova

# Toward the definition of a timeline

## Some personal thoughts

- Constraints from our commitment to other experiments (MEG, Mu3e, muEDM, PIONEER...) to be considered
- An important milestone will be a proof of principle of resolutions achievable with the conversion technique:
  - e.g. CEX reaction with active converter + TPC angular sector in a O(1 T) magnet
- Single phase vs. staged approach:
  - e.g. would it make sense to perform a phase-1 experiment with a few to several  $10^7$   $\mu/s$  ( $\rightarrow$  gaseous tracker à la MEG could be used) but  $\sim 4\pi$  acceptance?



# News

- We are going to submit a 2M€ grant request to the Italy Research Ministry
  - Principal investigator: Paolo Cattaneo
  - Project tailored on the expertise of the Italian groups (gaseous trackers + scintillator-based positron timing)
  - More details will be discussed by Paolo today

# News

- Two documents for the European Strategy for Particle Physics are planned:
  - general document on muon cLFV experiments (MEG + Mu2e + COMET)  
—> will contain a short section on future  $\mu \rightarrow e\gamma$
  - specific document about a future  $\mu \rightarrow e\gamma$  experiment
- **Deadline: March 31st, 2025**

## Future perspectives for $\mu^+ \rightarrow e^+\gamma$ searches

The working group for future  $\mu^+ \rightarrow e^+\gamma$  experiments

11th February 2025

Abstract

### 1 Introduction

In the standard model (SM) of particle physics, charged lepton flavour-violating (CLFV) processes are basically forbidden with only extremely small branching ratios ( $\sim 10^{-54}$  [1]) when accounting for non-zero neutrino mass differences and mixing angles. Therefore, such decays are free from SM physics backgrounds and a positive signal would be unambiguous evidence for physics beyond the SM. Several SM extensions predict CLFV decays at measurable rates, and the channel  $\mu^+ \rightarrow e^+\gamma$  is particularly sensitive to new physics. Reviews of the theoretical expectations and experimental status are provided in [1, 2].

### 2 Current experimental status

Editor: W. Ootani

### 3 Beam availability

Editor: G. Dal Maso

### 4 Experimental approach

#### 4.1 Experimental concept

Editor: F. Renga

#### 4.2 Positron tracking

Editor: A. Schoening

#### 4.3 Calorimeter experiments

Editor: A. Papa

#### 4.4 Conversion experiments

Editor: W. Ootani, F. Renga

### 5 Sensitivity

Editor: A. Oya

### 6 Schedule

Editor: W. Ootani