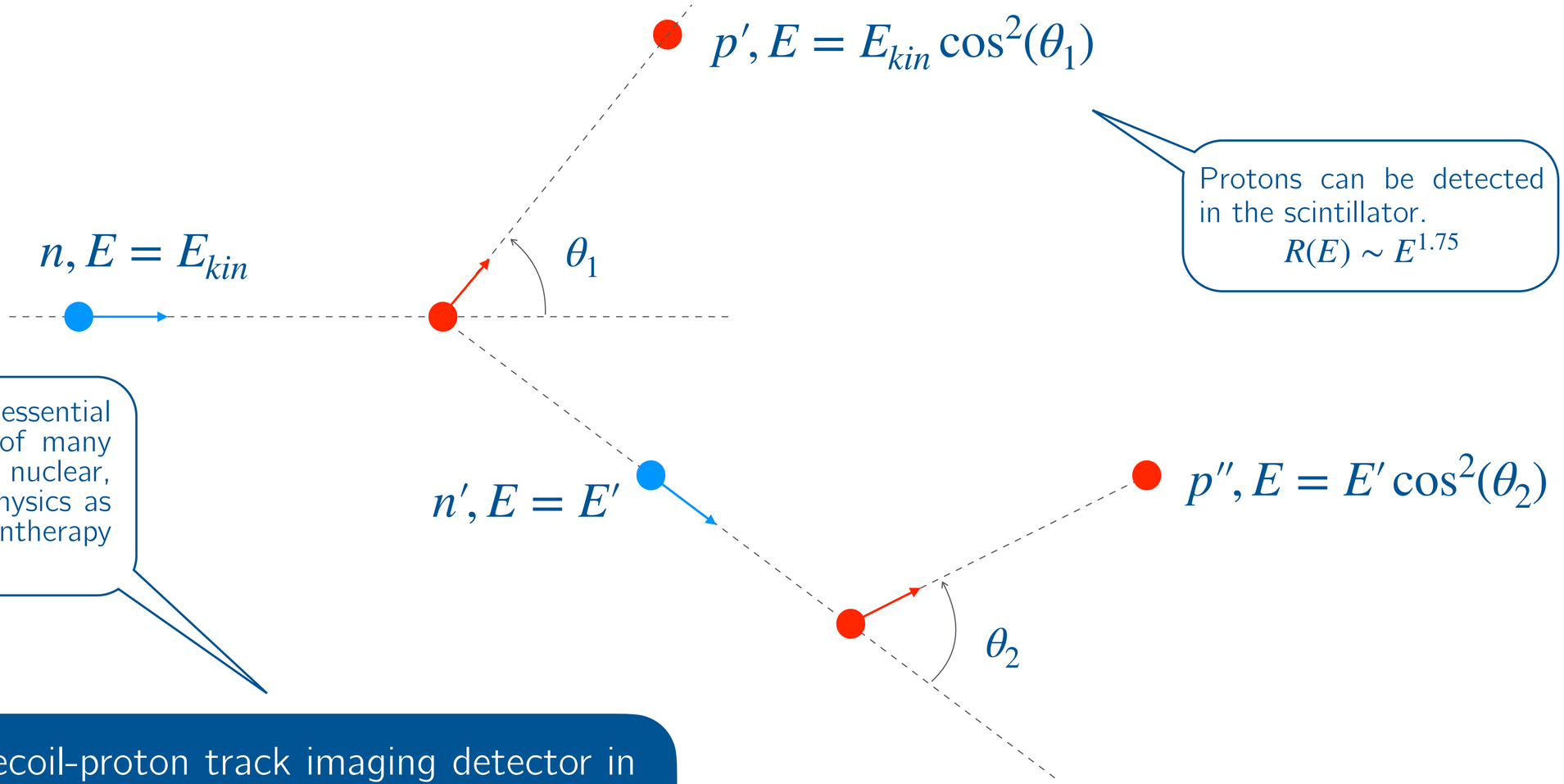
RIPTIDE

CSN5@CNAF

Samuele Lanzi - 21/06/2024

Objective



Protons can be detected in the scintillator.

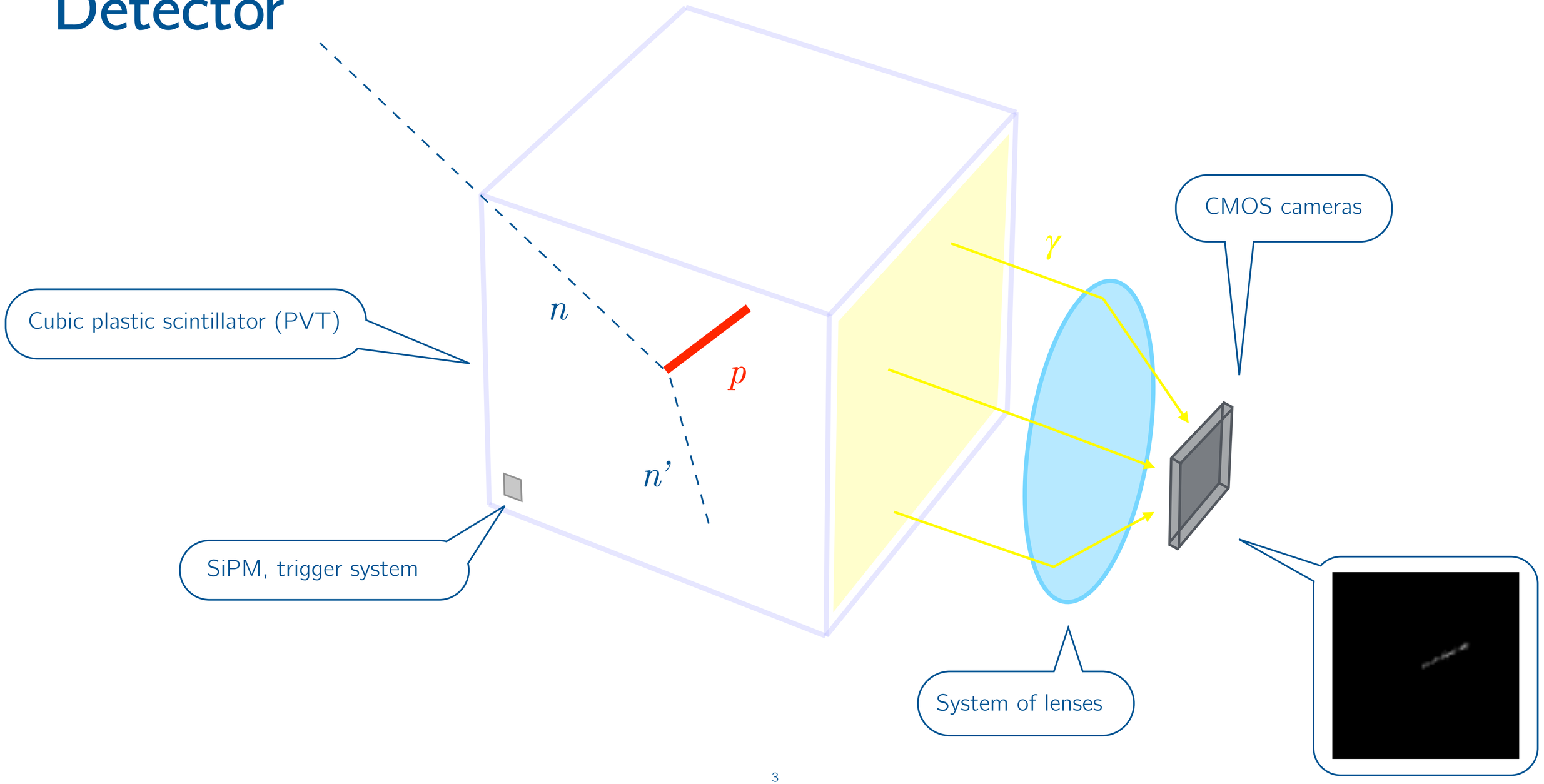
$$R(E) \sim E^{1.75}$$

Neutron detectors are an essential tool for the development of many research fields, such as nuclear, particle and astroparticle physics as well as radiotherapy/hadrontherapy and radiation protection

Build a novel recoil-proton track imaging detector in which the light output produced by a fast scintillator is used to perform a complete reconstruction in space and time of the interaction event

No neutron-tracker detector capable of reconstructing the momentum is in the data tacking phase right now

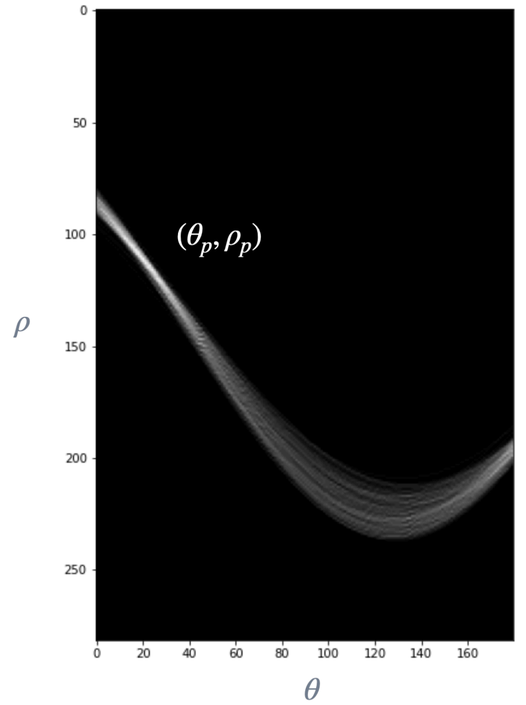
Detector


Cubic plastic scintillator (PVT)
SiPM, trigger system
n
p
n’
γ
CMOS cameras
System of lenses

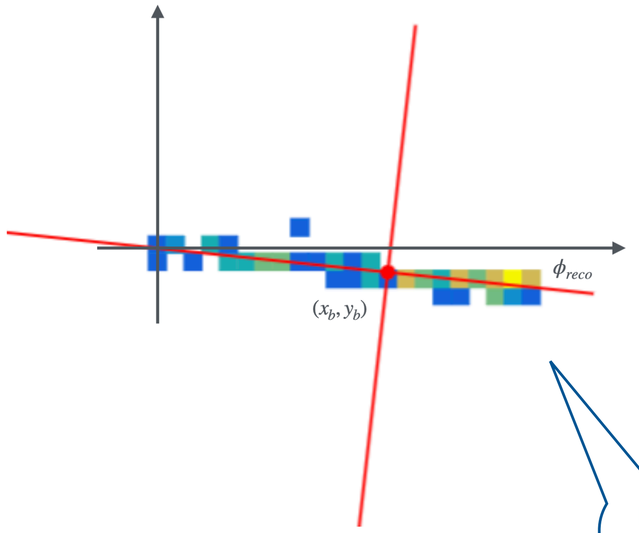
CNAF contribution

Software development for track classification, track reconstruction and Monte Carlo simulations

Using Hough transform to reconstruct the 3D direction starting from 2D projections



Using CNNs to classify single/double scattering



Using a momenta based method in order to calculate centroid, Range and Bragg peak position in the track

People and budget

People manly in Bologna:

- R. Spighi (RN) - 0.5 FTE
- C. Massimi - 0.5 FTE
- A. Mengarelli - 0.5 FTE
- R. Ridolfi - 0.2 FTE
- P. Console Camprini (ENEA) - 0.5 FTE
- F. Giacomini - 0.1 FTE

+ N. Terranova (ENEA, LNF) - 0.5 FTE

Estimated budget for 3 years

- Instrumentation 25 - 80 k€
- Computing 15 k€