

Sealed mini-TEPC for hadron therapy

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Introduction

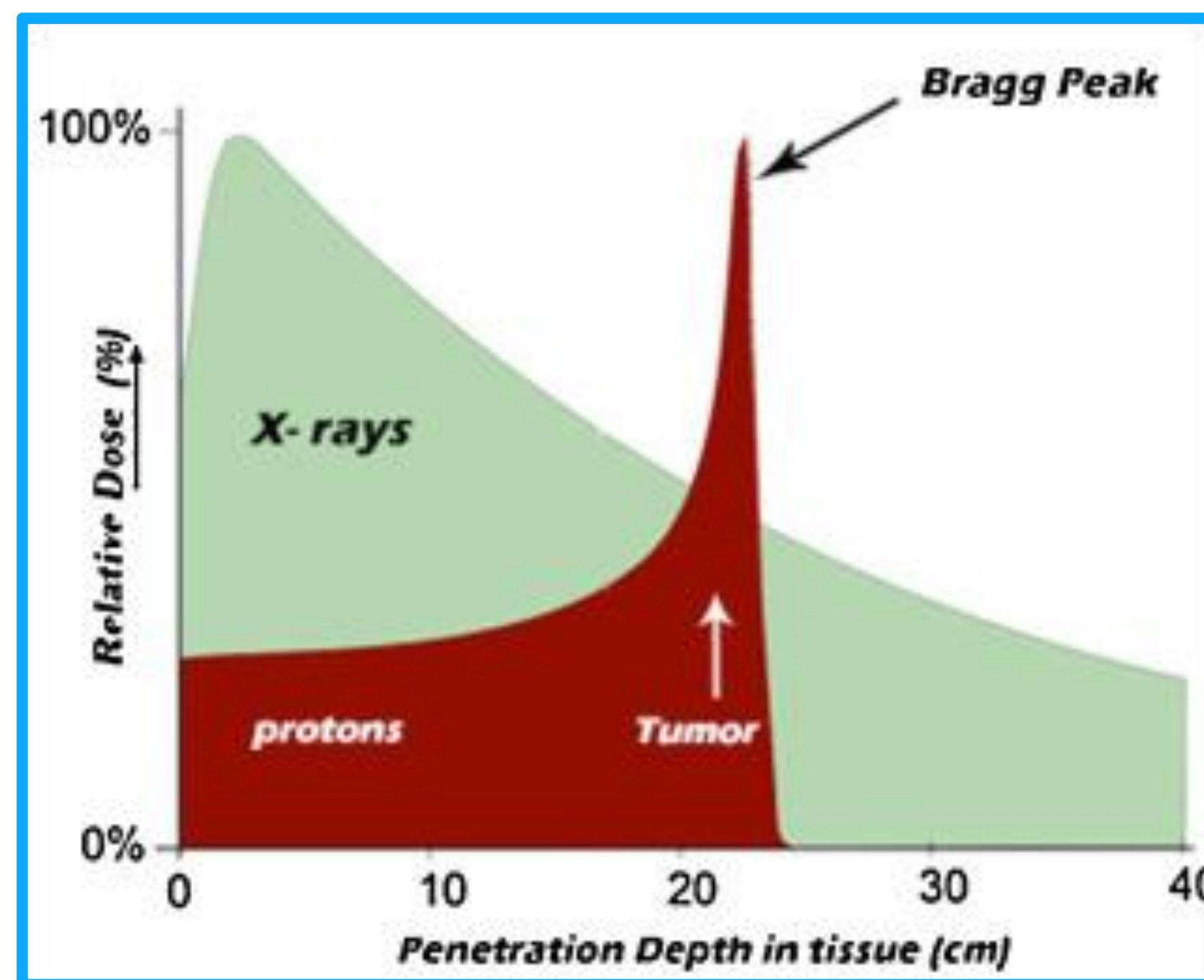
- The use of radiation therapy with protons is increasing worldwide because of the favourable depth-dose distribution.

PHYSICS $\longleftrightarrow$? $\longleftrightarrow$ BIOLOGICAL EFFECT

Detailed knowledge needed: local energy deposition at sub-cellular scale

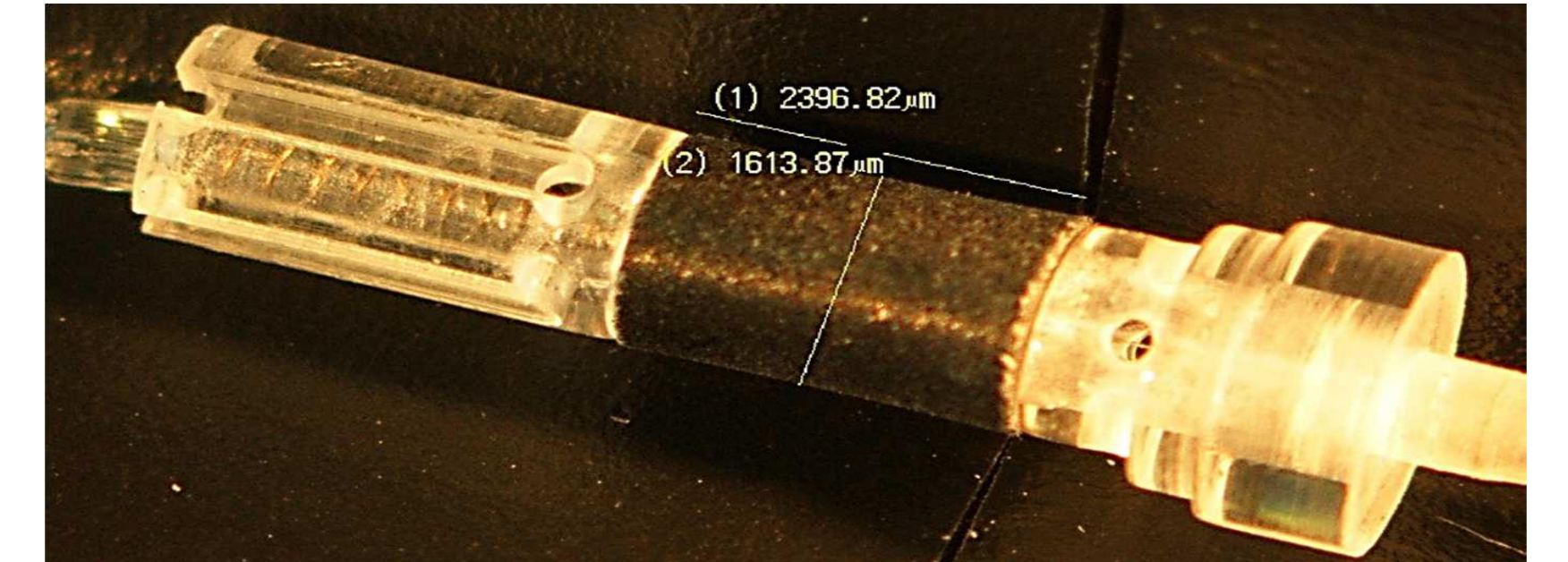
MICRODOSIMETRY
From average values to stochastic

- TEPCs are the reference detectors



Objectives

Build and test a portable sealed mini-TEPC (on the basis of a LNL-INFN project) optimized for therapeutic proton beams.



Materials and methods

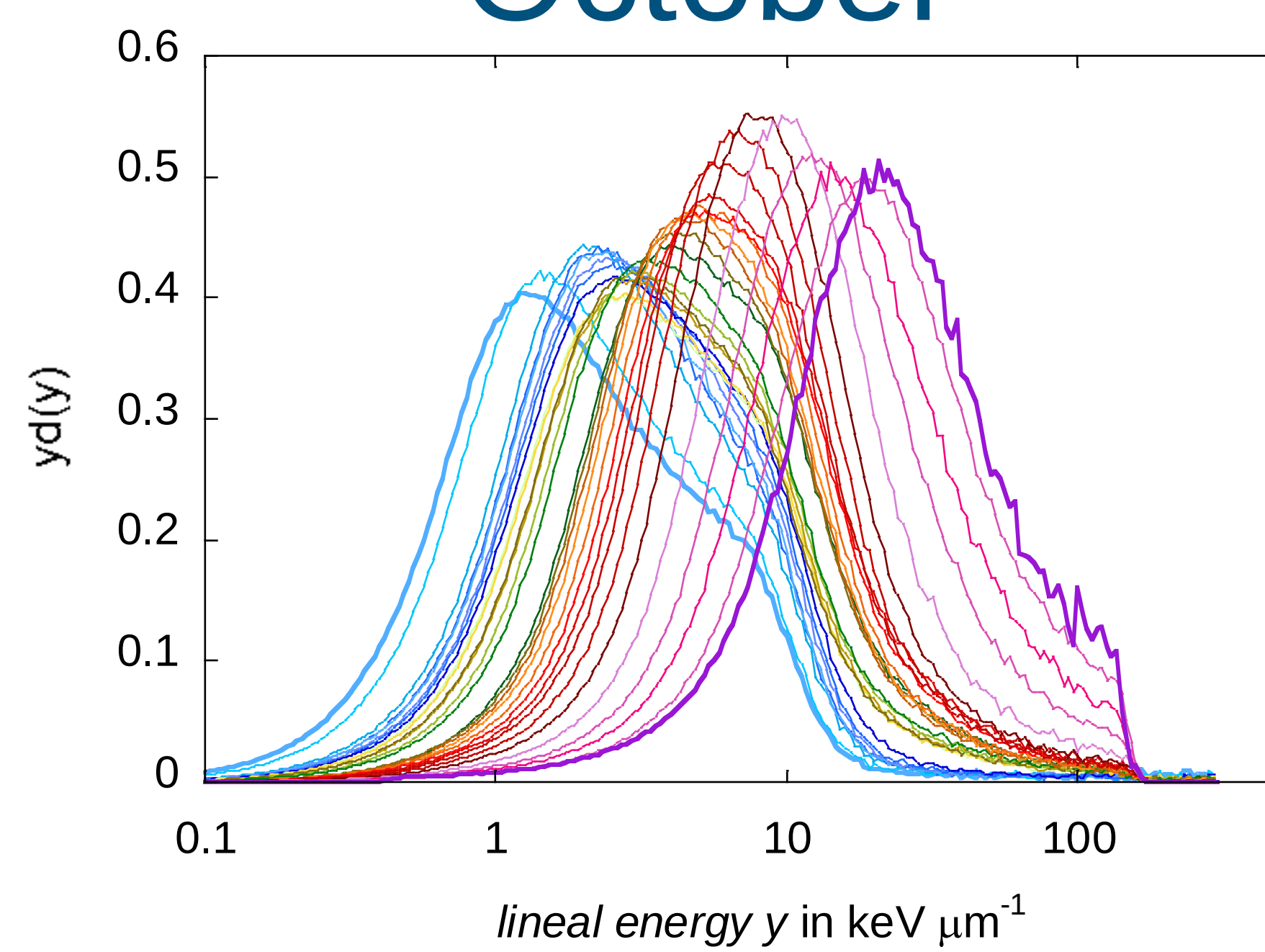
Measurements were performed with a **sealed** mini-TEPC developed at the LNL – INFN laboratory.

The detector was meant to work in gas – flow modality, and these were the first feasibility tests in gas – steady modality.

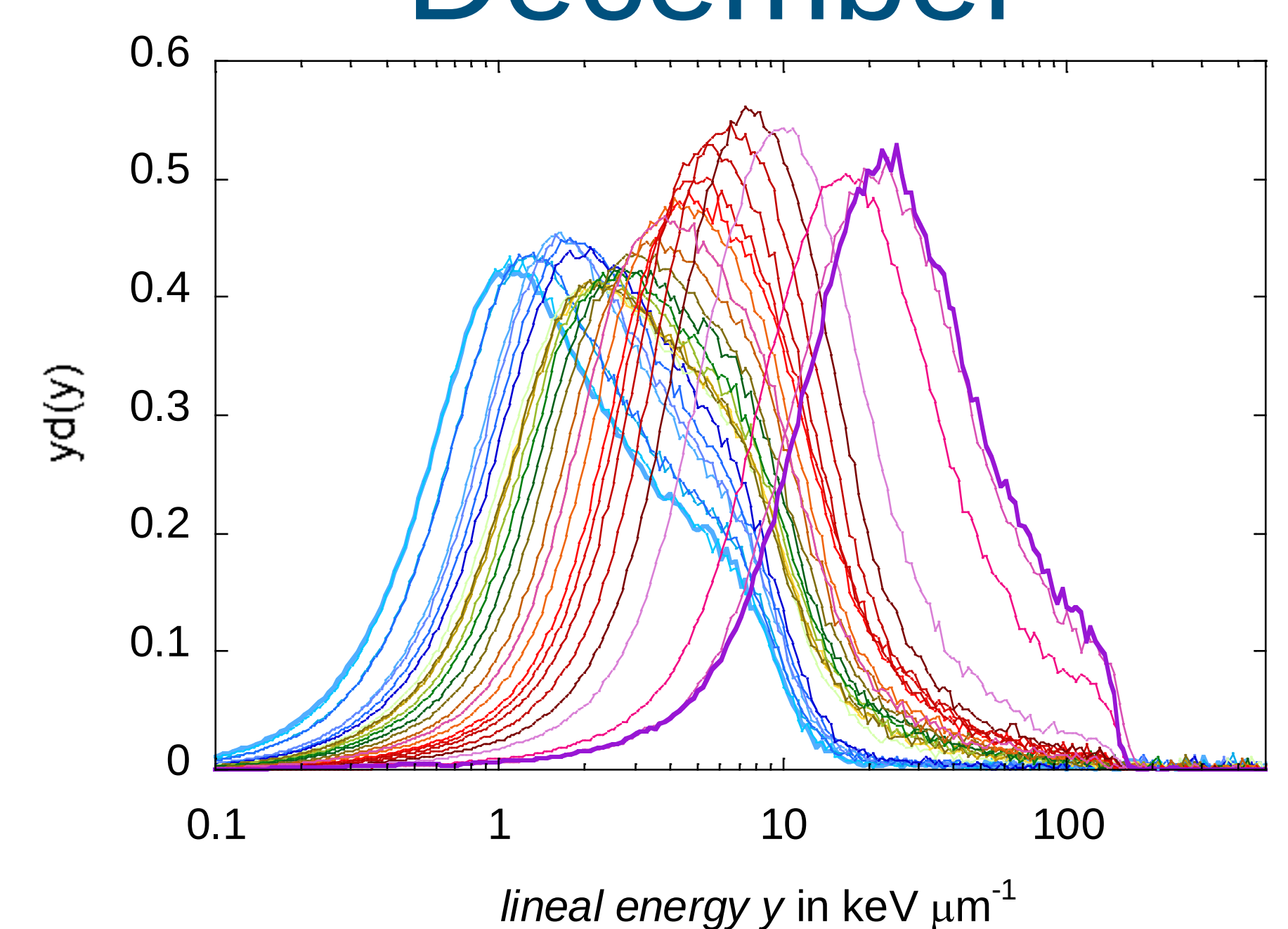
We measured at the 62 MeV proton beam line of CATANA, already used to treat ocular melanoma.

The tests were performed in October and December 2018, respectively 1 month and 3 months after the sealing. They are going to be repeated in February 2019 after 5 months in order to check the detector stability.

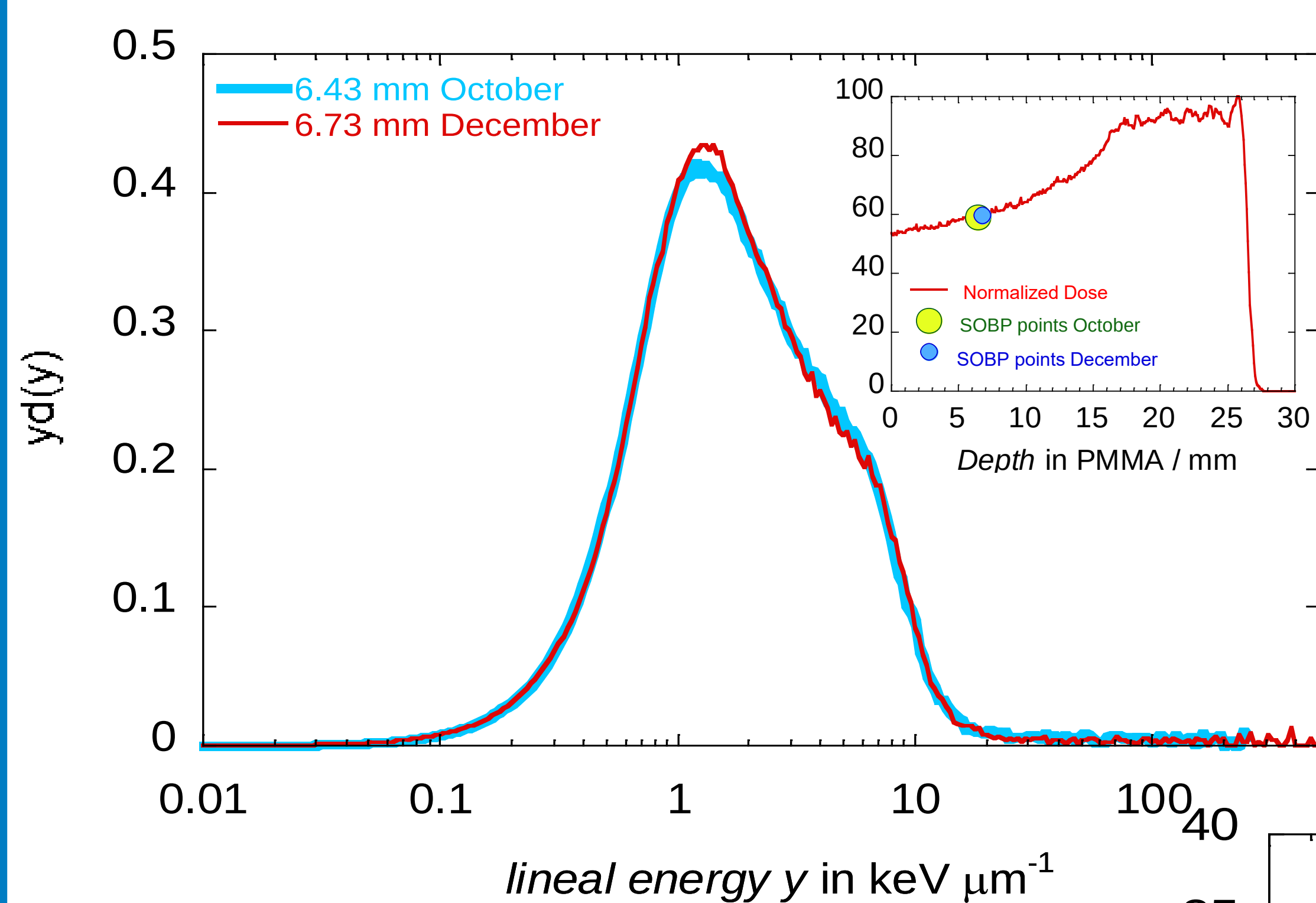
October



December

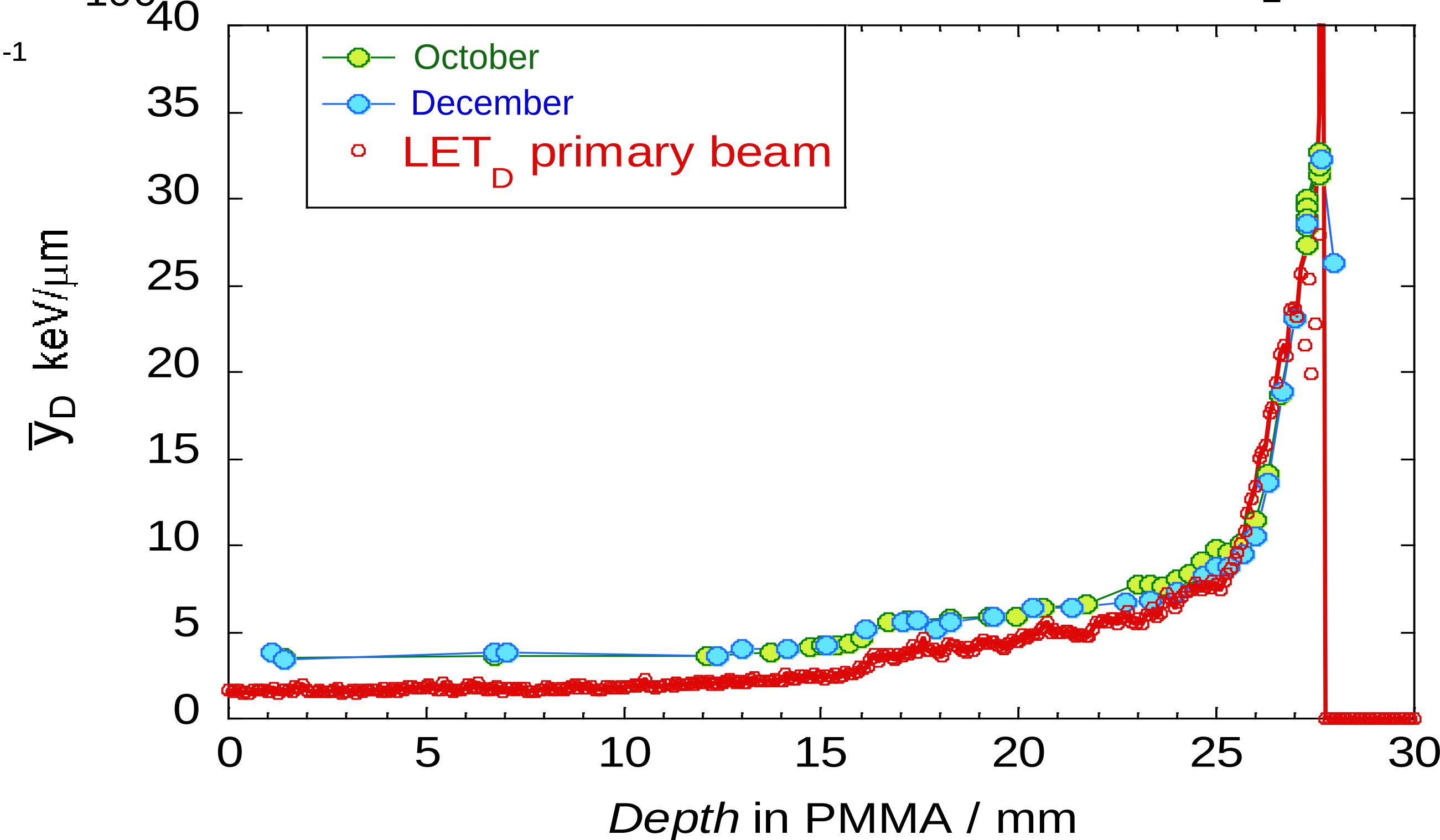


Shape invariance test

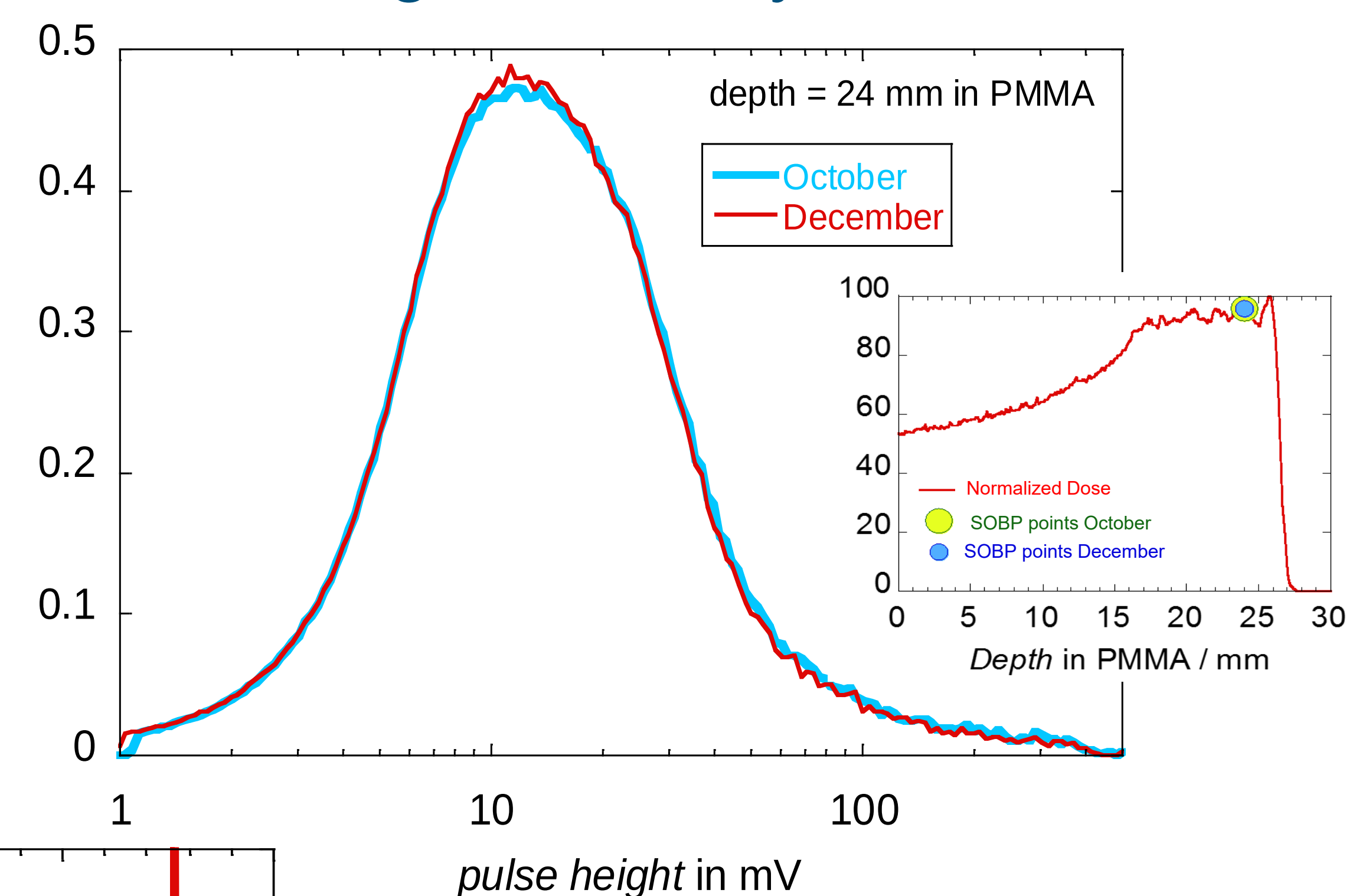


Results

$\bar{y}_D$ compared to LET



Gas gain stability test



Conclusion

- The detector was pretty stable after 3 months in gas – steady modality.
- Further tests are going to be performed in February after 5 months sealed.