

Dosímetros de plástico para avaliação em tempo real do risco de exposições em radiologia

Plastic dosimeters for real-time
radiological exposure risk assessment

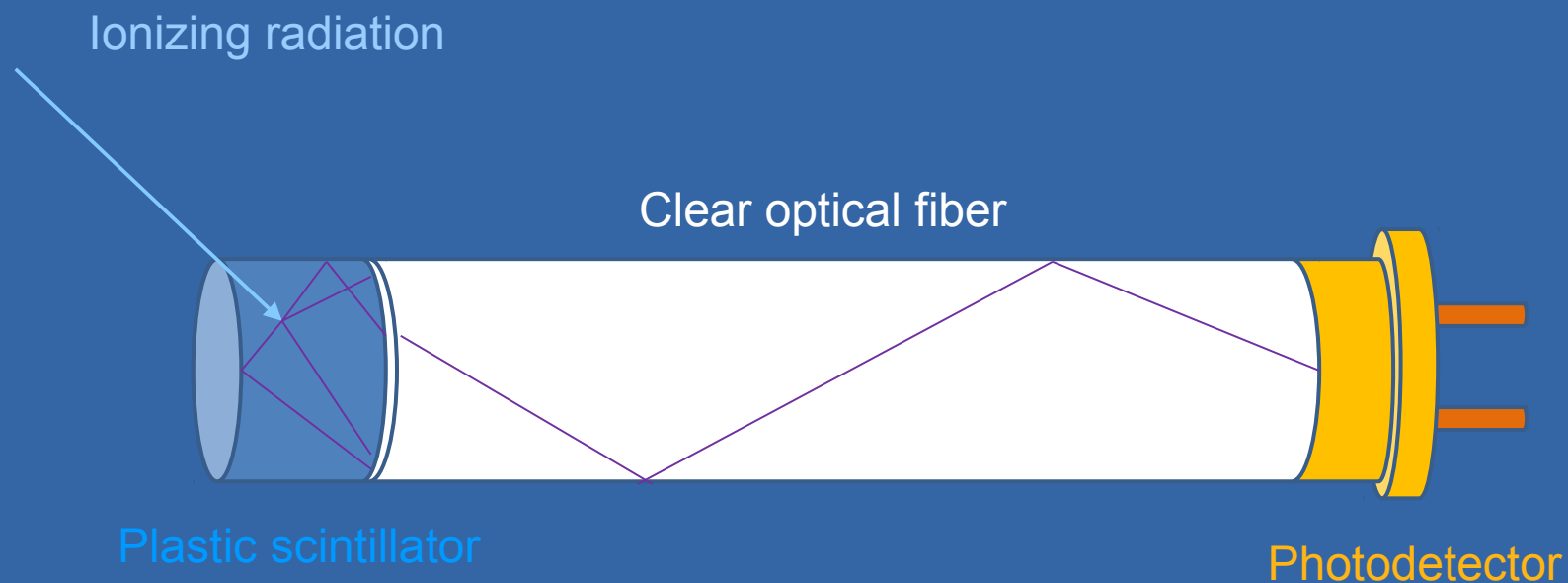
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Plastic dosimeter general concept



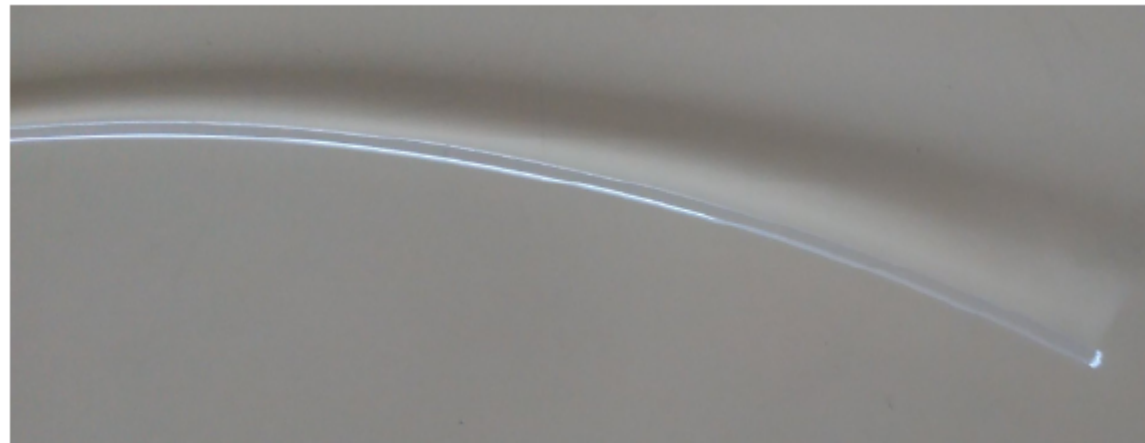
Why use a plastic dosimeter?

- Plastic density similar to water
- Linear response with dose
- Good dose rate independence
- Small beam energy dependence
- Small temperature dependence
- Good spatial resolution
- Real-time dose measurement
- System can be made “affordable”

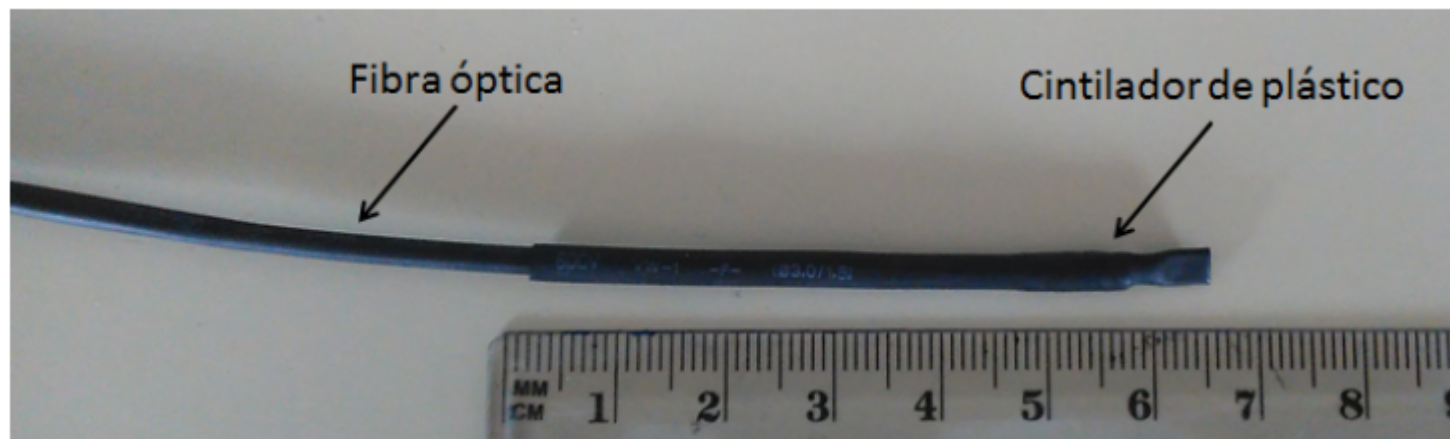
Drawbacks...

- Signal depends on readout system
- Can not be used as primary dosimeter
- Dedicated calibration needed for used beam quality
- Fluorescence light can be produce in optical cable

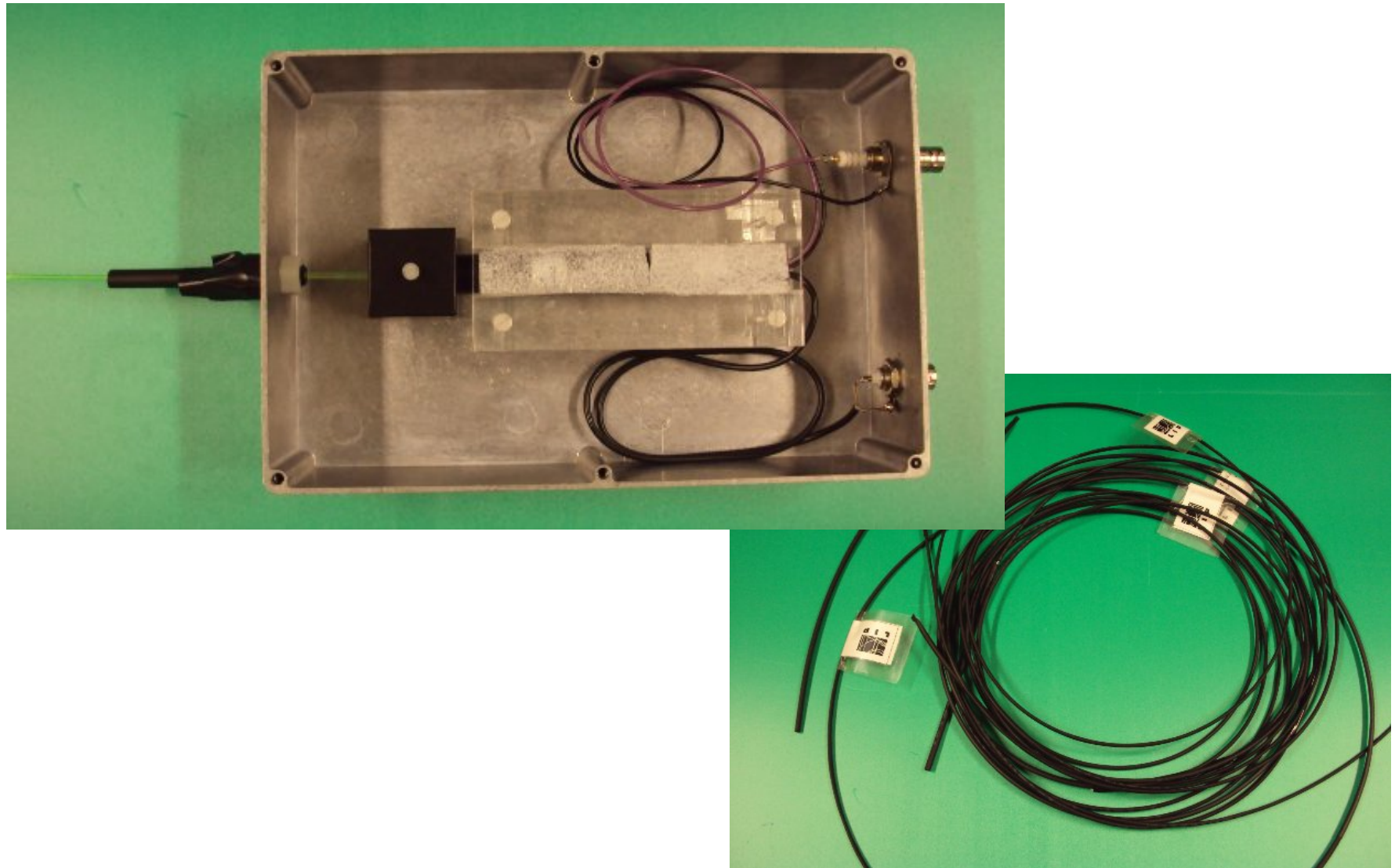
Optical cable



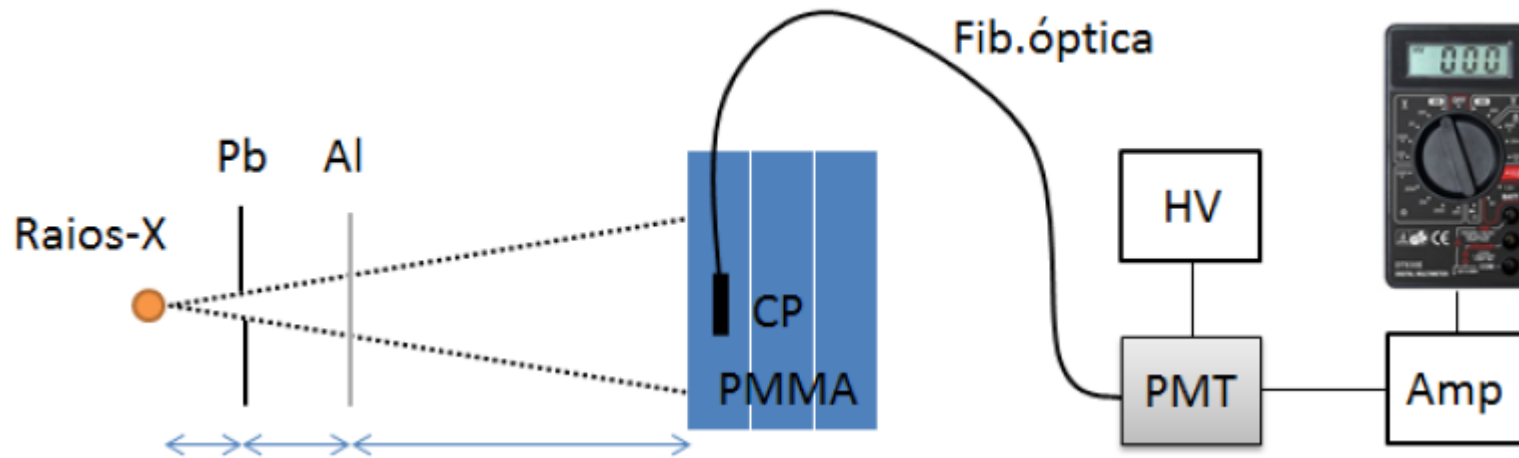
2 mm in diameter PMMA optical cable



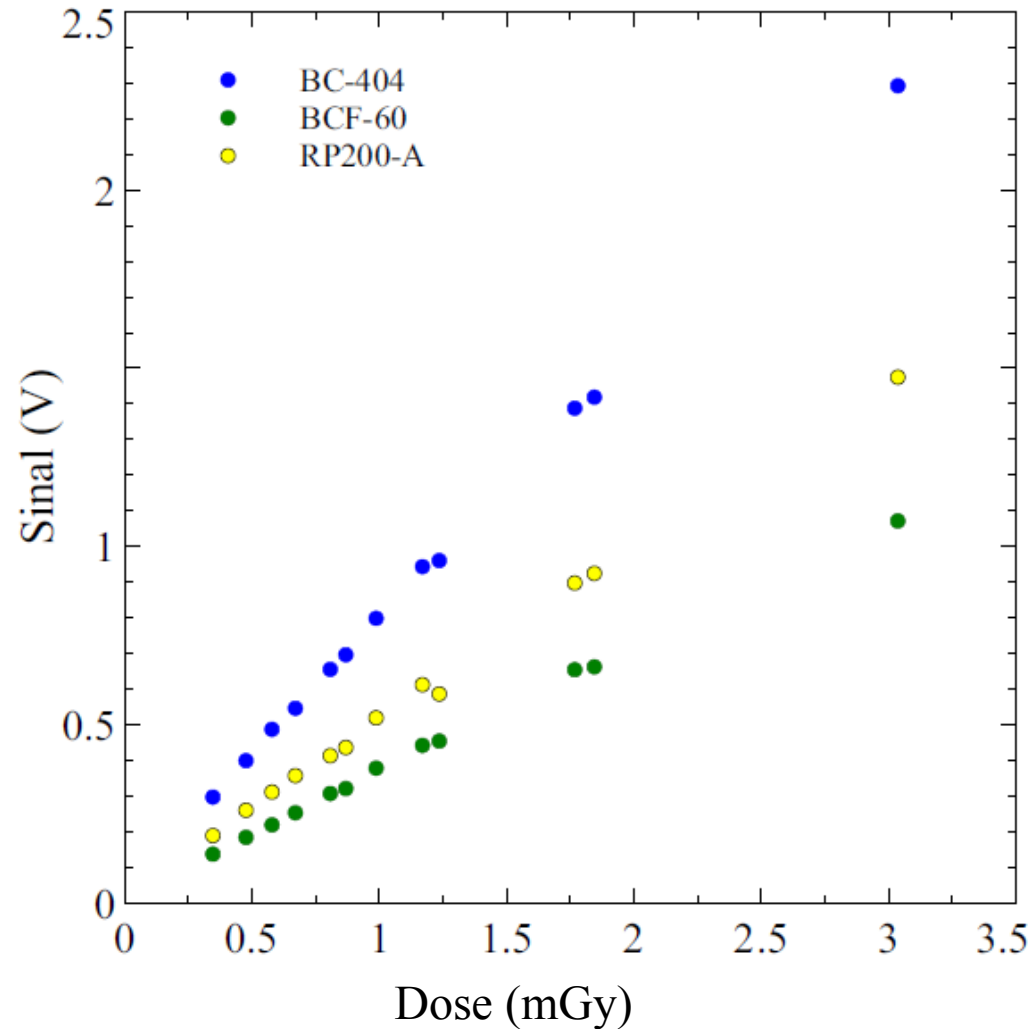
Scintillator dosimeter readout: PMT Hamamatsu R647P



Scintillator test and selection setup

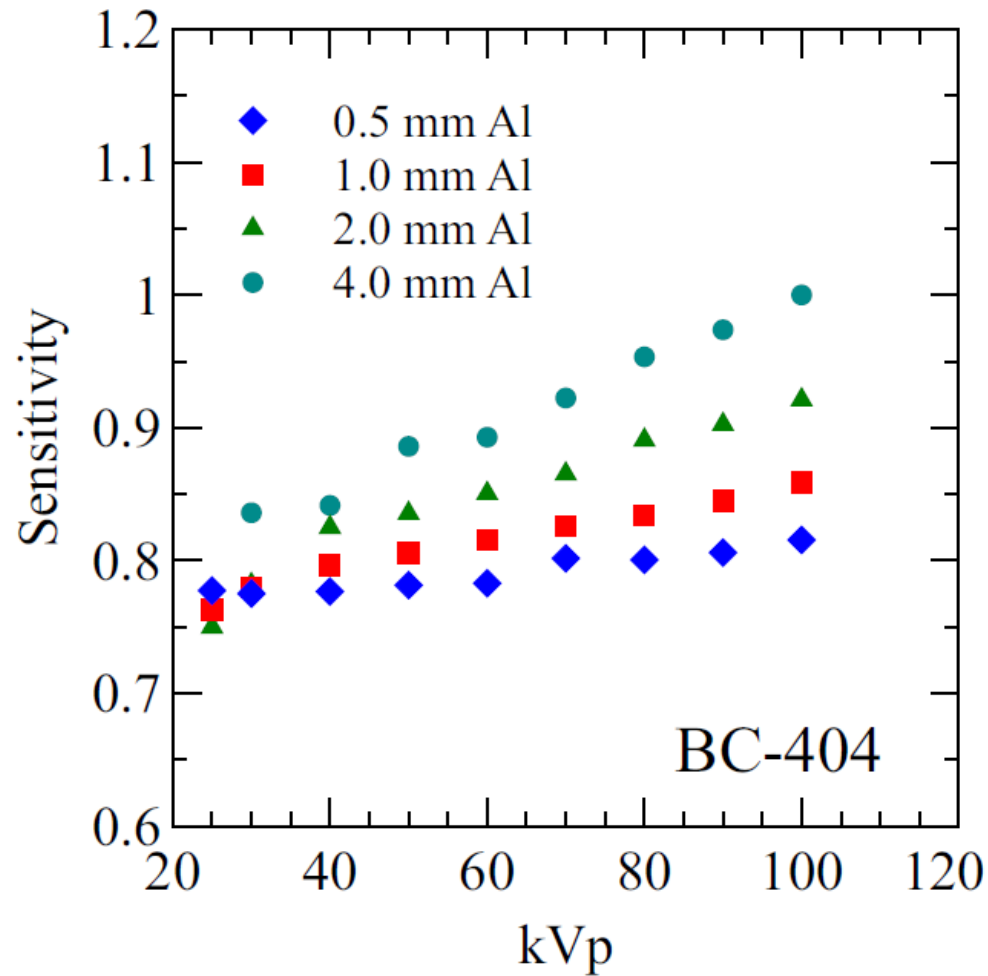


Scintillator selection results



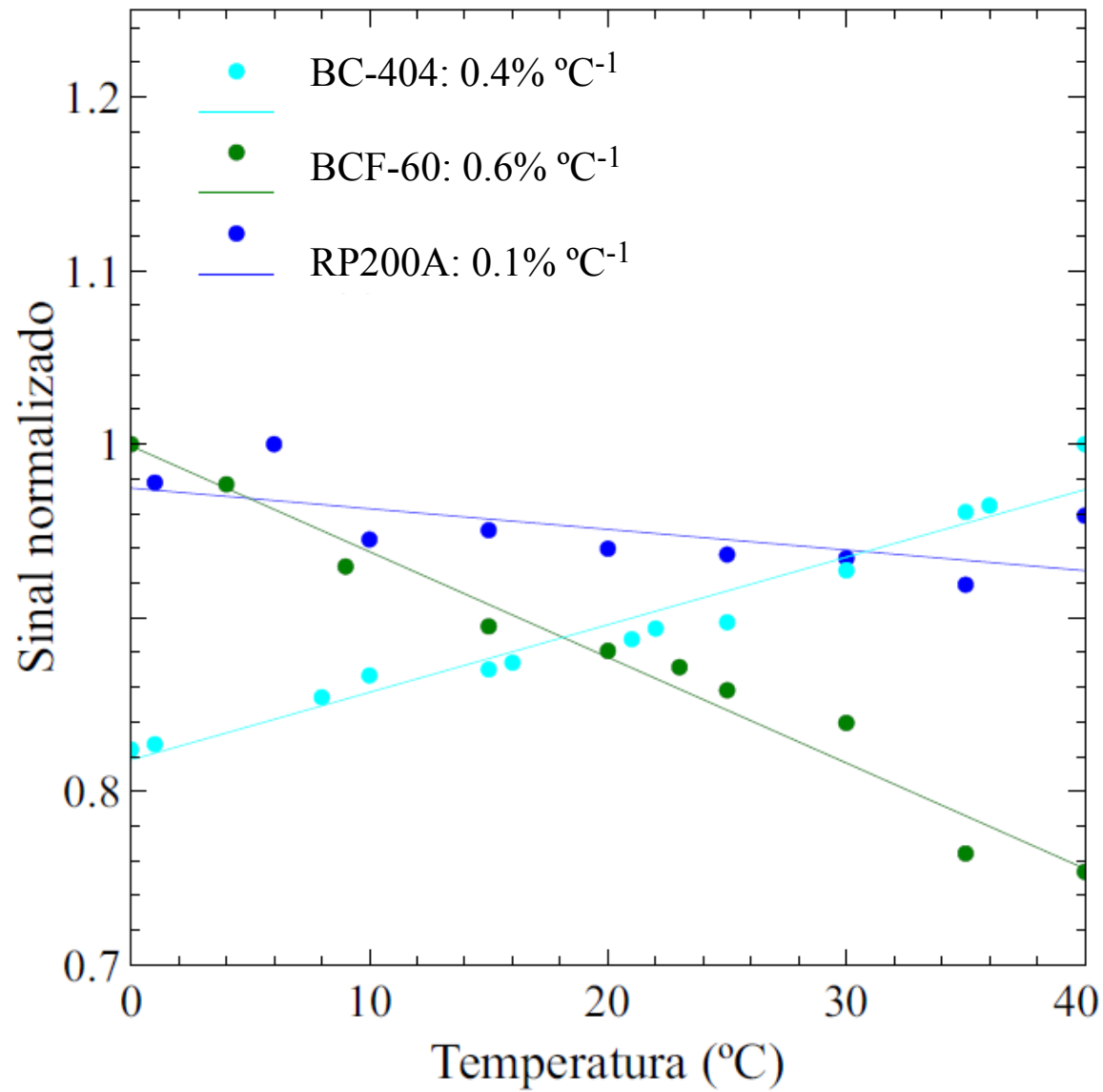
L.Peralta and F Rego, Phys.Med.Biol. 59 (2014) 4621-4633

Energy dependence



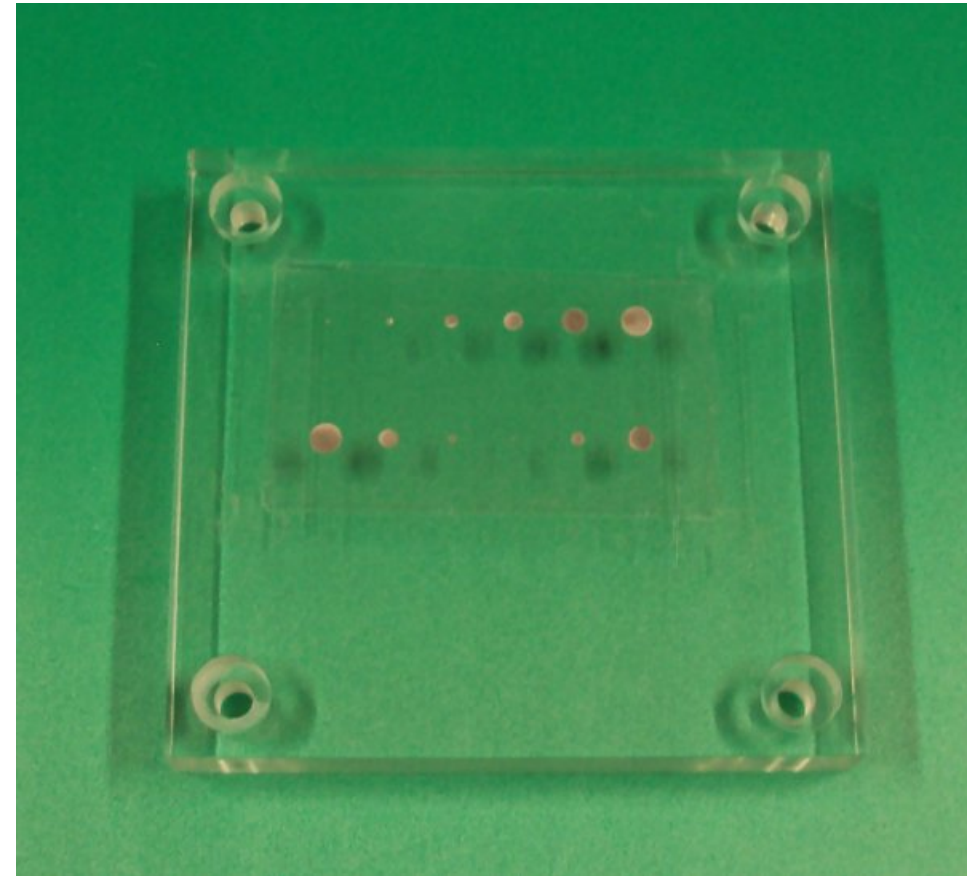
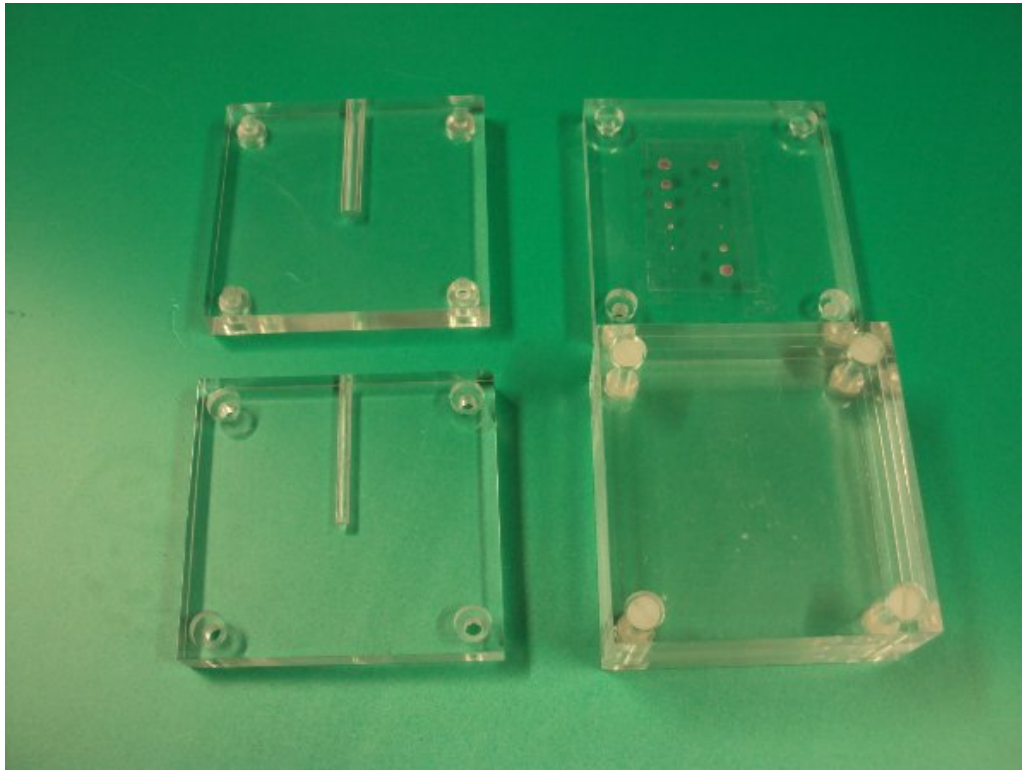
Scintillator signal dependence on temperature





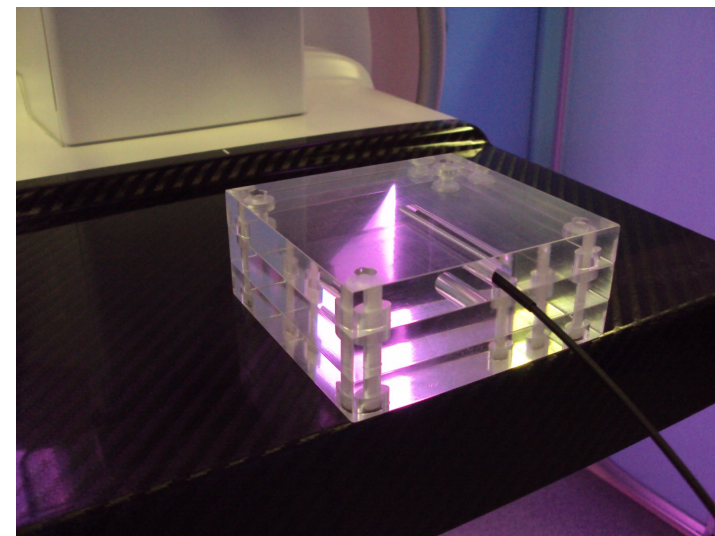
Phantom for Tomosynthesis tests

PMMA breast phantom
(made @ LIP Coimbra workshop)



Set of simulated lesions
(Al precision disks)

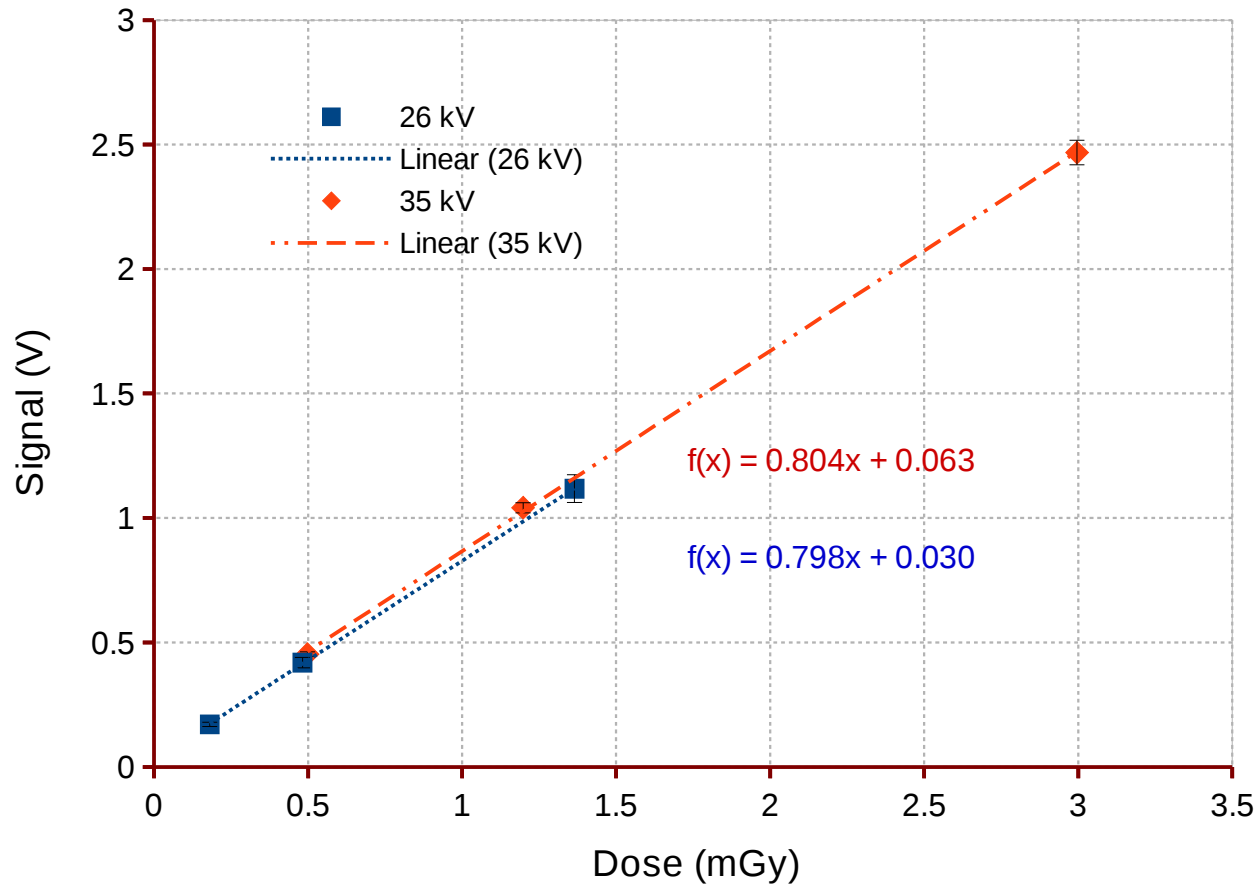
Dose study with breast slice phantom @ Hospital da Luz Siemens Mammomat



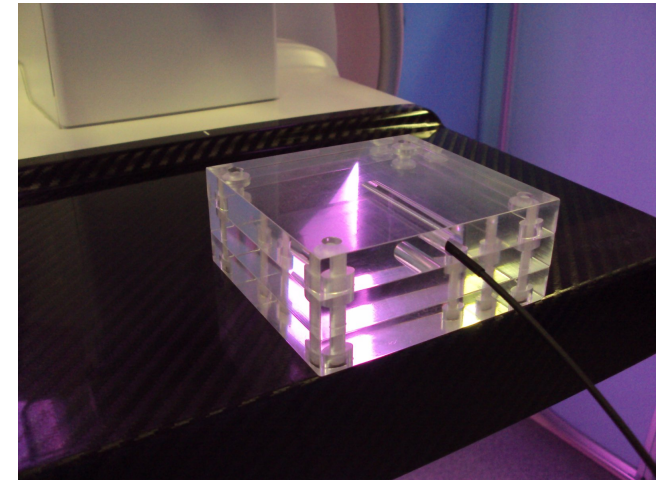
Results with BC-404 Scintillator

Siemens - Mammomat

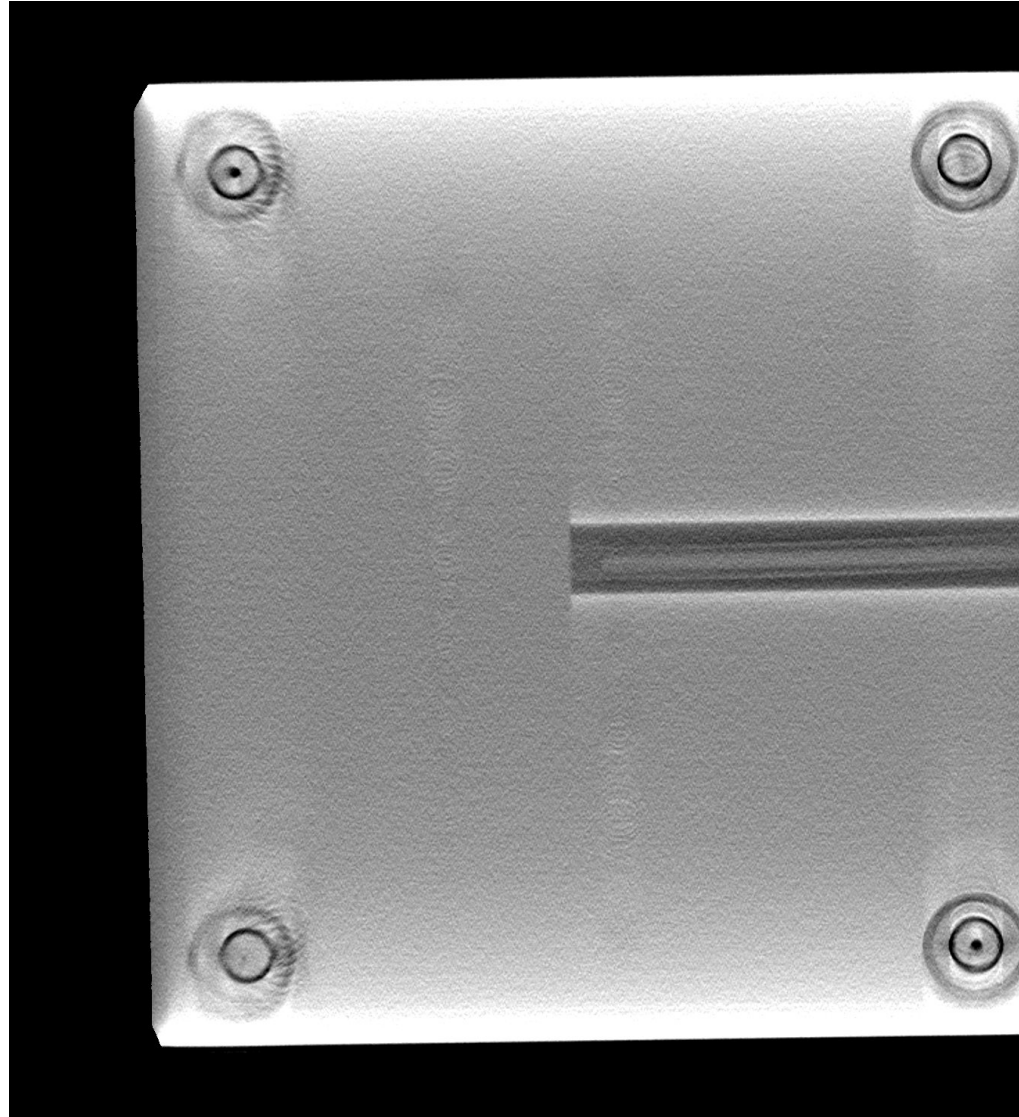
Sc Dosimeter vs Ionization Chamber



One point per slice



Dosimeter image inside phantom



Conclusions:

An easy to operate dosimetry system for radiological real-time measurements have been developed.

The system gives accurate dose measurements in the mammography energy range

Further clinical tests are foreseen with different CT machines and other radiological equipments

Acknowledgments

João Antunes (Ciências/Ulisboa)

Prof. Nuno Matela (Ciências/Ulisboa)

Doutora Florbela Rego (LIP)