HiFi : A scintillation detector for muons

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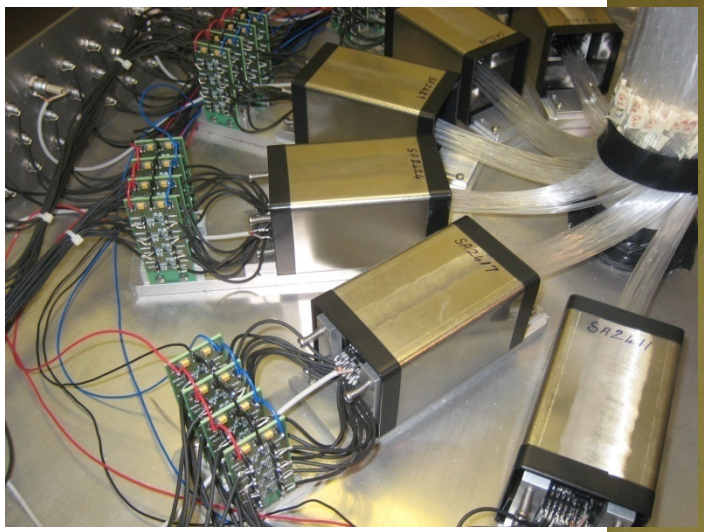
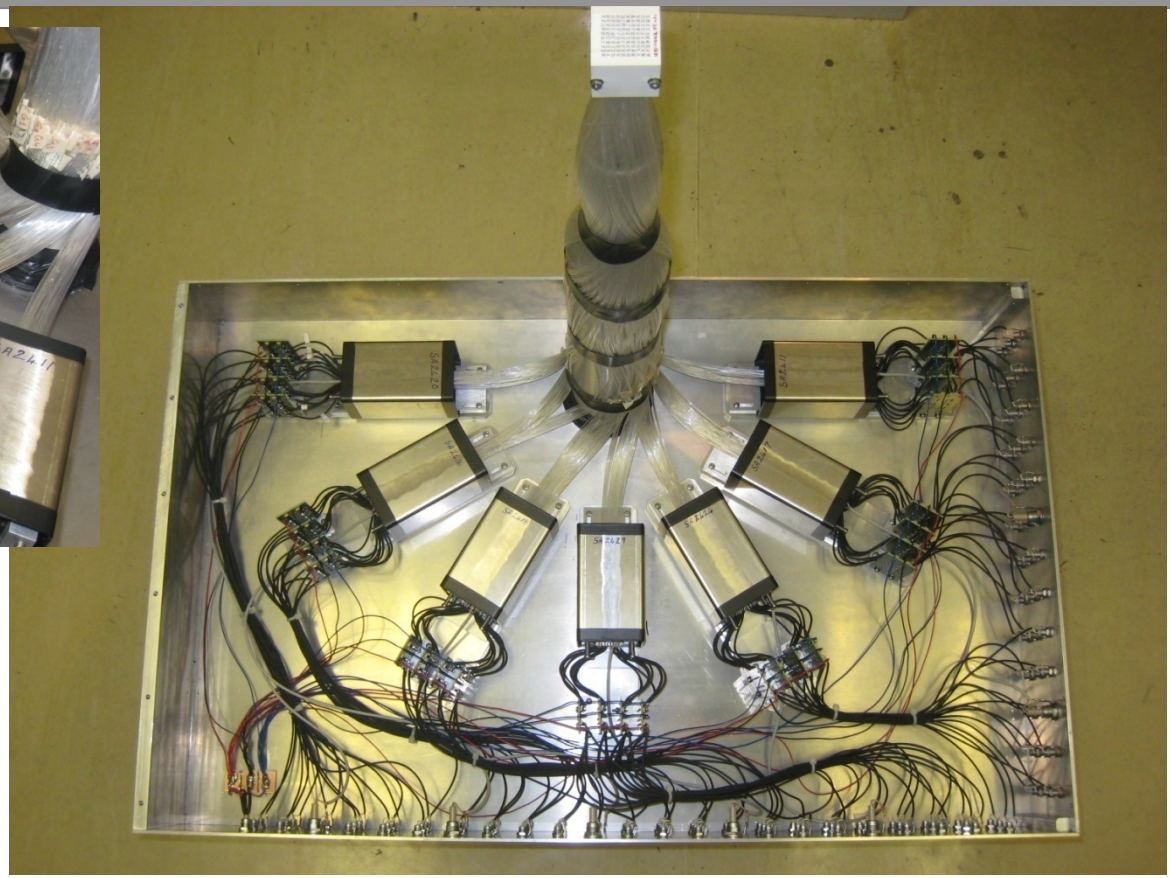
Ancient Charm – A detector for Cultural Heritage applications





1.8 x 1.8 mm^2 pixels, 9 mm deep on a 2.5 mm pitch

A 100 pixel detector for neutron resonance transmission imaging

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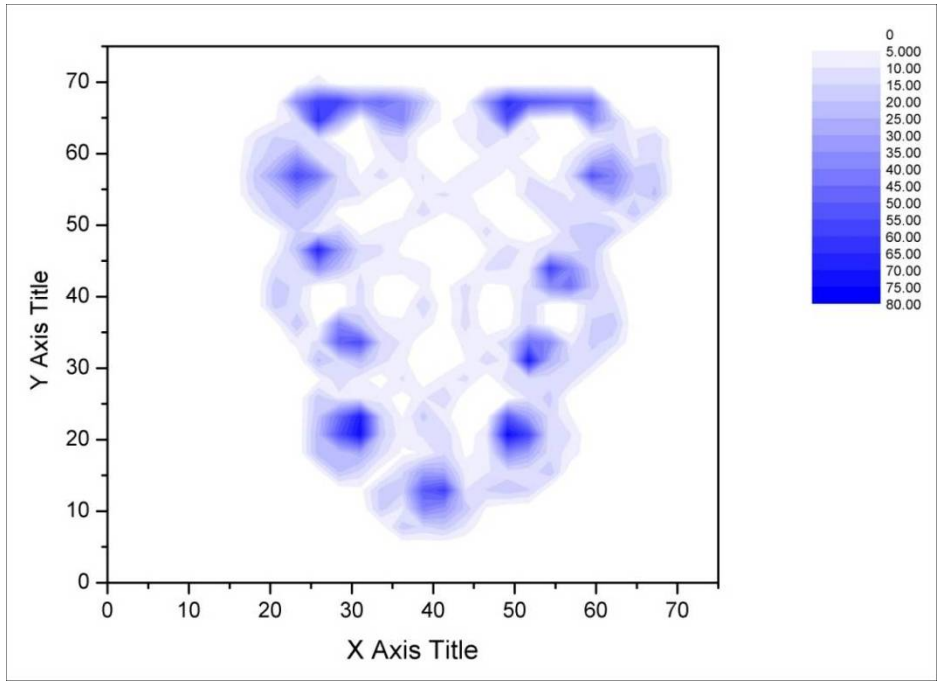
Ancient Charm – A detector for Cultural Heritage applications



The map on the right shows the distribution of silver in this replication of a belt buckle

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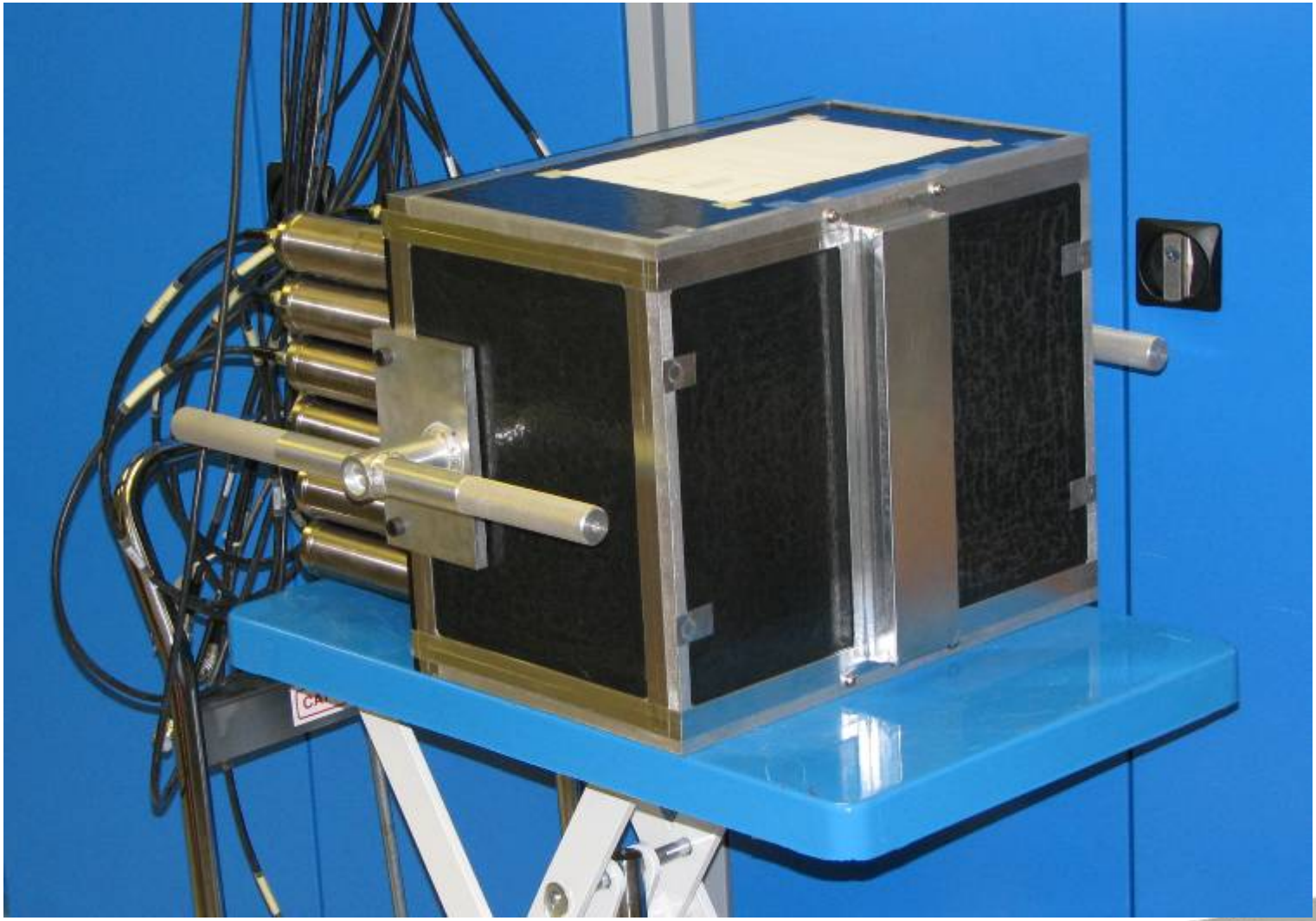
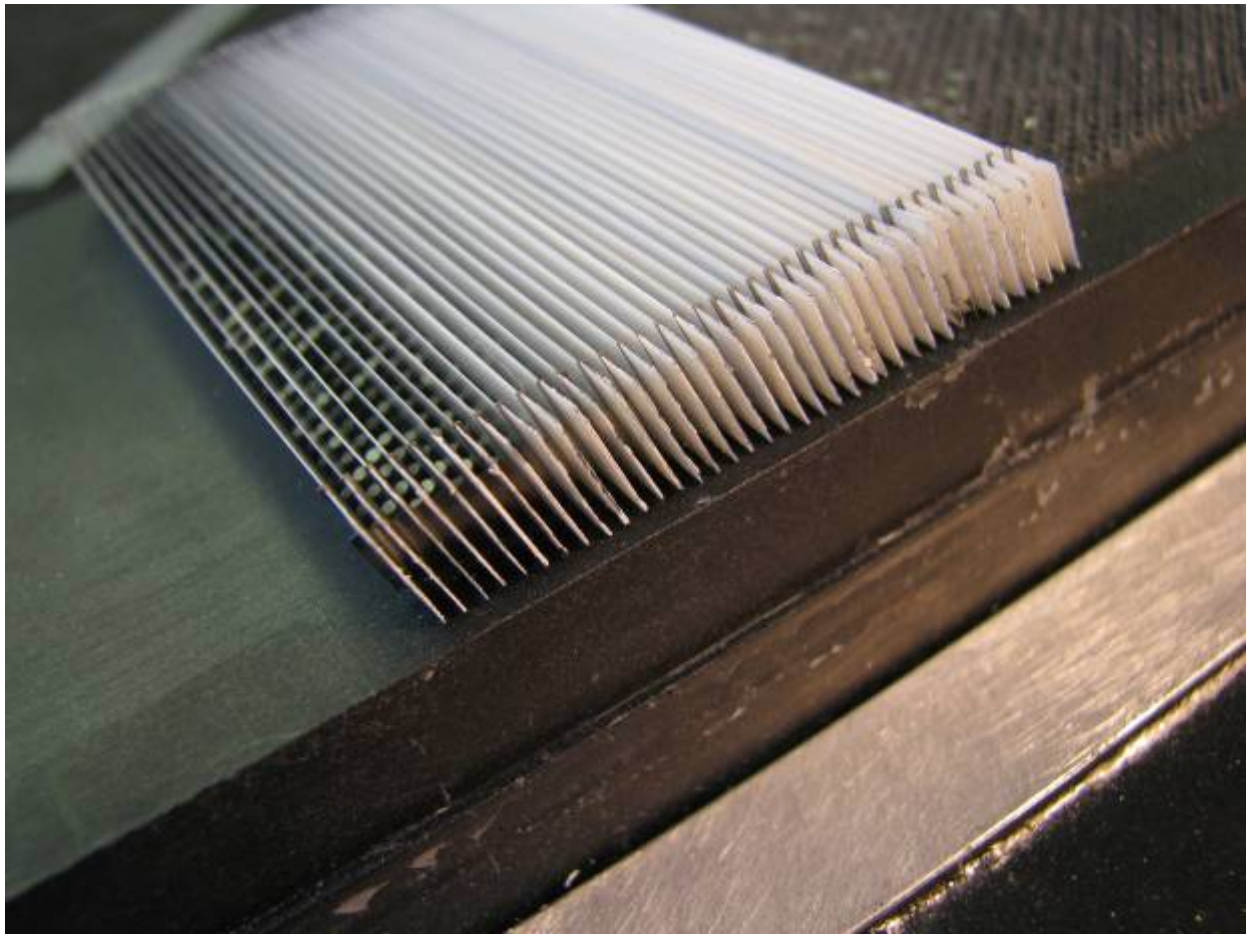
INTER 1.2 mm scintillation detector



TS2 ISIS second target station project

Science & Technology Facilities Council ISIS

INTER 1.2 mm scintillation detector



Fibre coupled ZnS scintillation detector
Linear position sensitivity, 1.2 mm resolution

TS2 ISIS second target station project

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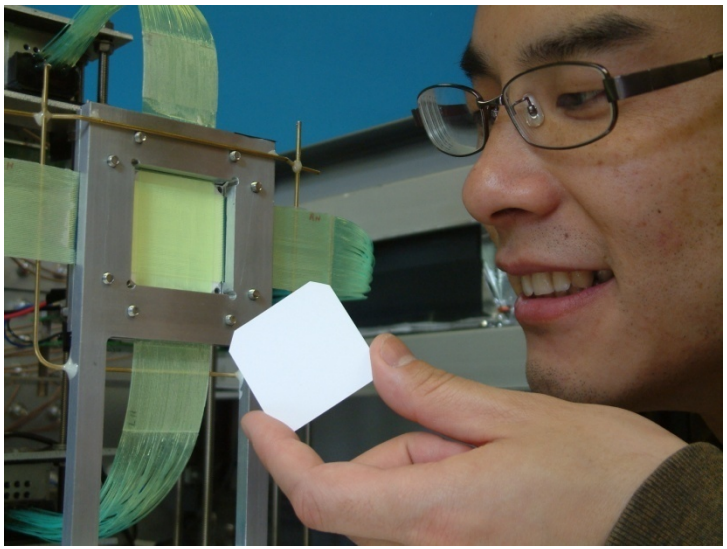
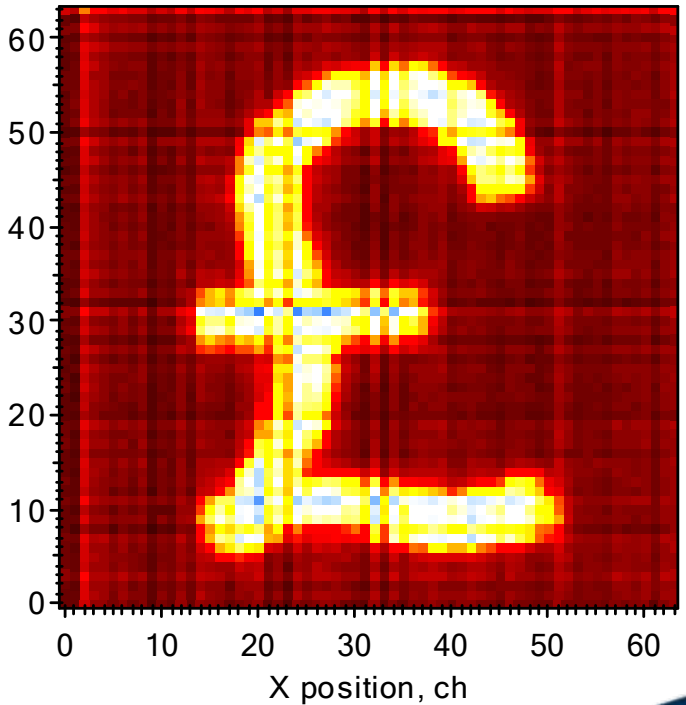
WLS Fibre development





- Carried out in collaboration with JAEA
- Currently manufacturing a linear position sensitive WLS fibre detector for reflectometry
- 320 x 60 mm2
- Mechanics and electronics in manufacture
- Hope to start assembly in June
- Linear position sensitivity ~ sub mm
- Coded fibre array –
- using twenty-four 16 channel MA PMTS

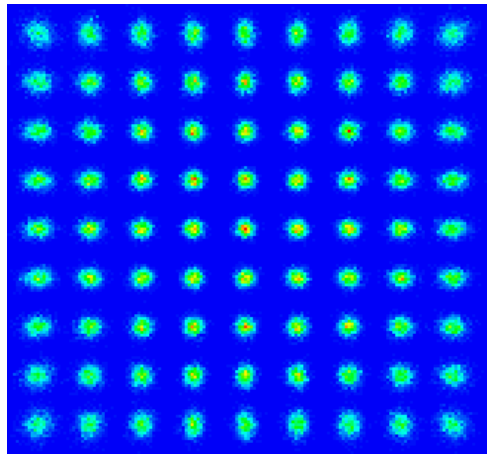
GSPC Simulation and measurement

Simulation

- 36mm MSGC-PMT gap.
- 2x2, 30 mm ∅ PMT.
- 2E6 photons/neutron.
- Holes on 4.3mm pitch.

➢ FWHM in centre 1.4mm

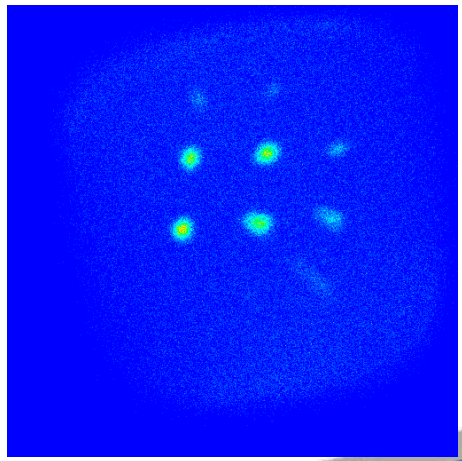
➢ Measurements close to simulation



Measurement

- 2250V BIDIM 80
- MSGC-PMT gap 35 mm
- Holes on 4.3mm pitch
- FWHM in centre 1.3mm

➢ FWHM in centre 1.3mm



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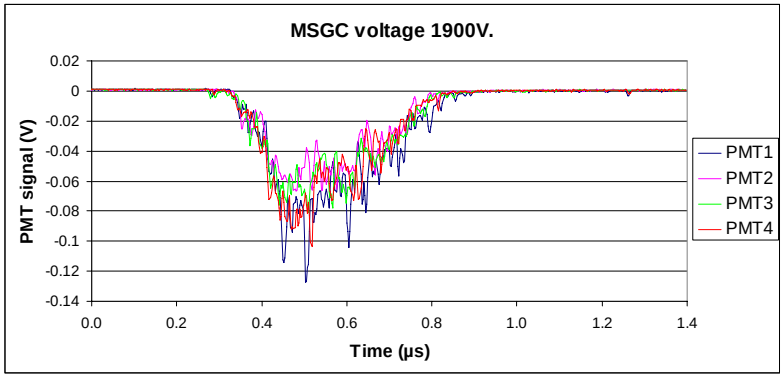
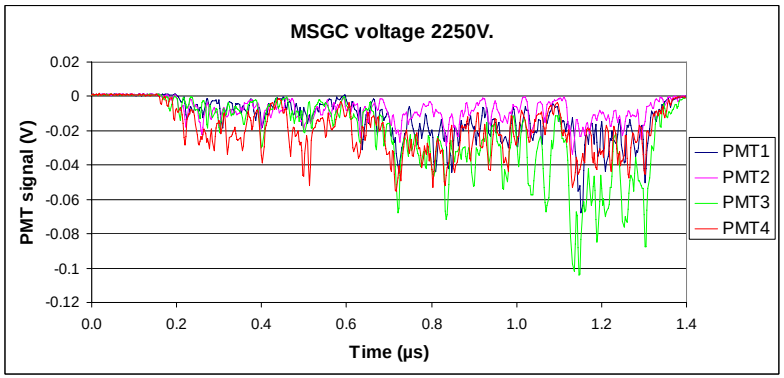
GSPC output signals



BIDIM 80 1900 V 3He/CF4 2b / 2b

MSGC virtual

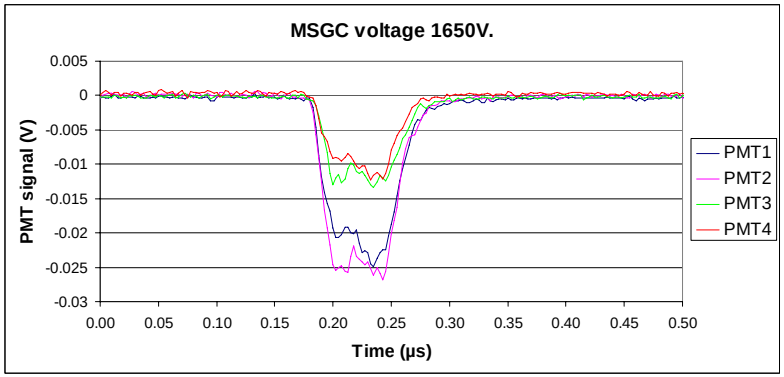
- **> 300 ns long**



BIDIM 80 2250 V 3He/CF4 2b / 2b

MSGC virtual

- **> 1µs long**



LIP GSPC 1650 V 3He/CF4 2b / 3b

MSGC real

- **60 ns long**

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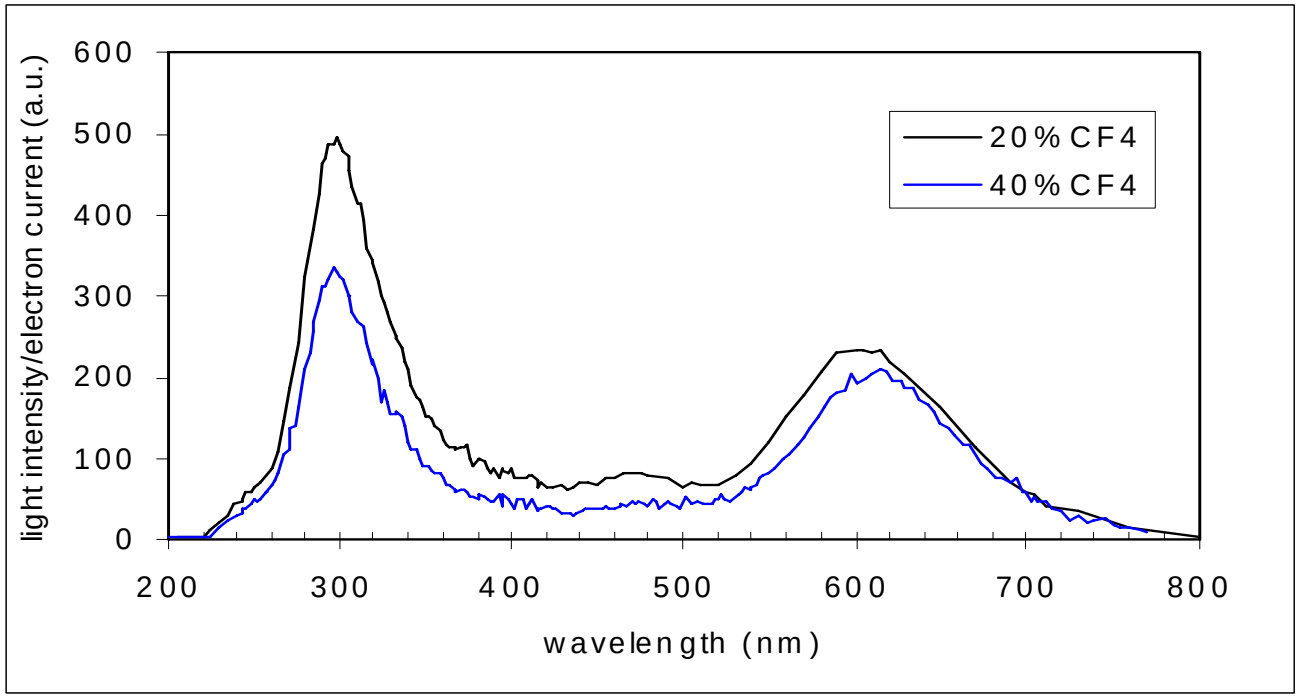
Task How can we exploit this spectrum

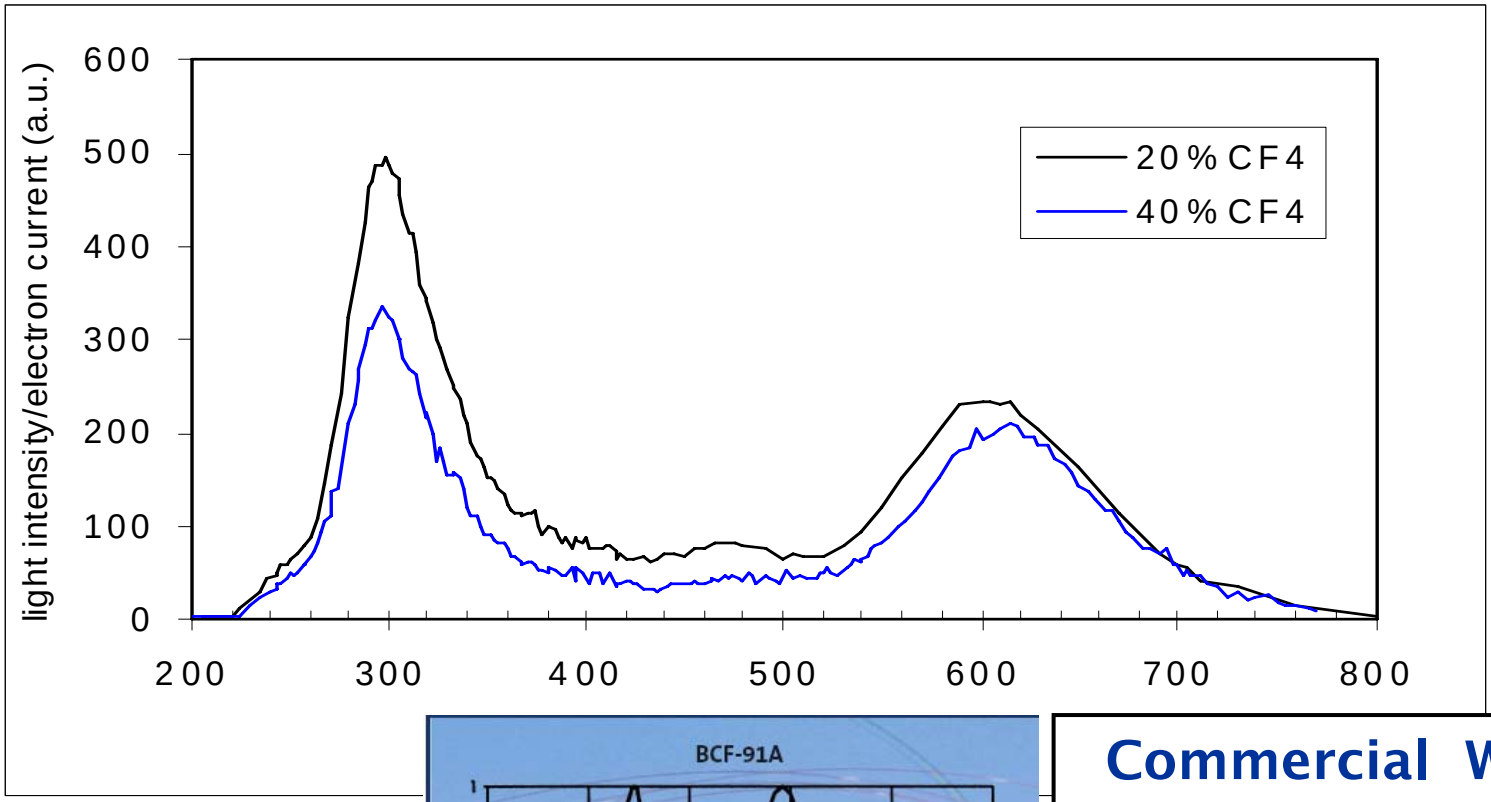


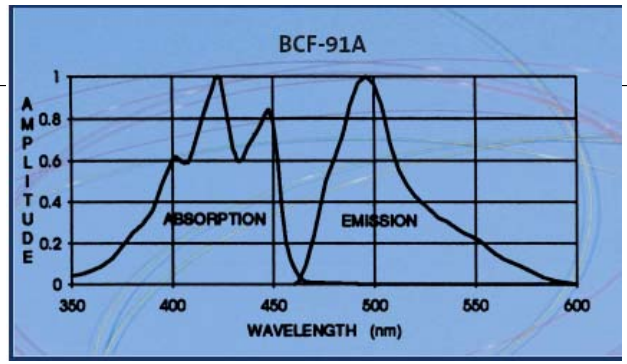
Anger camera PMT readout
Quartz window PMTs
Blue sensitive PMTs
Red sensitive PMTs
Can we Wavelength Shift?

WLS fibre readout?

Other?
APDs?

WLS Fibre readout?

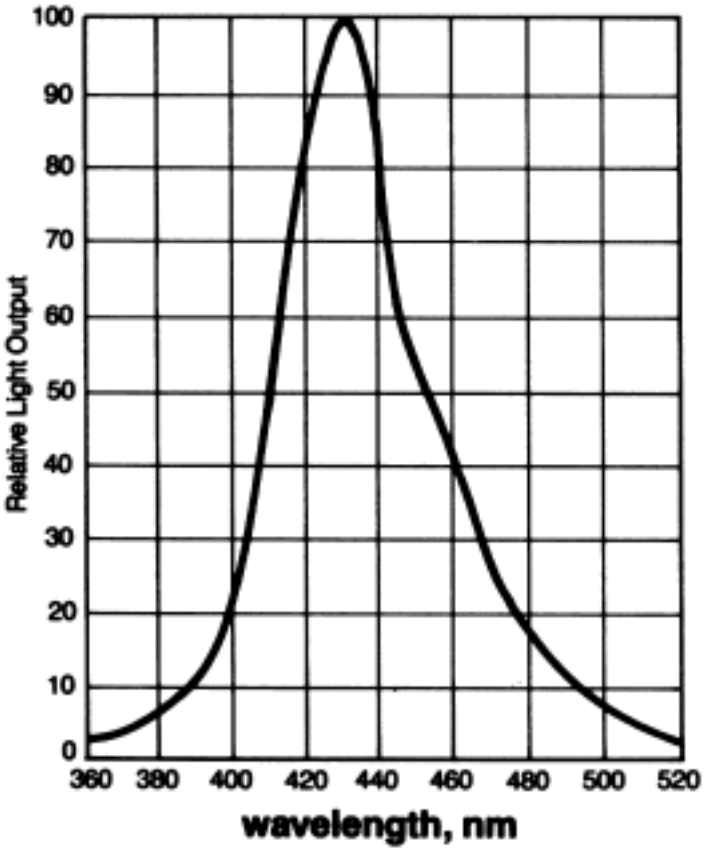




Commercial WLS fibre absorption band incompatible

WLS Fibre readout

Absorption spectrum



Bicron WLS bar

300 – 360nm to 425 nm

Francisco's experiences of coating GEMs with P-terphenyl?

Task 22.3: What we said

Readout investigation

Quantify the advantages of using quartz, blue and red PMTs

Explore the potential of:

Single cathode PMTs **PS PMTs** **MA PMTs**
APDs **SiPMTs** **Hybrid PMTs** **Other**

Utilize digitizer systems to capture detector / readout responses for analysis and optimisation and algorithm development

Electronics

Develop suitable

Voltage divider networks,

Front end electronics

Signal processing hardware to carry out neutron identification and position reconstruction in real time and display to a PC

Use results in the production of a scalable demonstrator detector

Task 22.3: What we said

To progress readout and electronics development

ISIS, Julich and Munich desire access to GSPC detectors

Is it feasible to construct a further two prototype detectors within the project?

What size?

Capable of evaluating 3 x 3 array of 30 mm dia PMTs?

Or mounting a 5 inch PM PMT

What cost?

How long to produce?

Needs input from ILL and LIP

Task 22.3: Deliverables

Deliverable	Description	Month
22.3.1.1	Experimental report on PMT anger camera	28
22.3.2.1	Experimental report on PS and MA PMTs	28
22.3.3.1	Experimental report on innovative light detecting devices	36
22.3.4.1	Evaluation report on processing schemes	28
22.3.6.1	Front end pulse processing report	30
22.3.7.1	Readout electronics architecture report	30
22.3.7.2	Hardware implementation report	40