

WP3(?) Construction and evaluation of PET probe optimised for paediatric PET imaging

1) Probe construction

Construction of the probe contains 3 major sub-tasks

- a) **Construction of the detector modules** will be based on experience gained and technologies developed during the FP7 Madeira project. Some technological improvements to increase the area of detectors may be investigated.
- b) **Cooling system** must be able to remove the heat generated by the detectors and read-out electronics. The main candidates are envisaged to be conductive cooling using carbon fibres with high temperature conductivity and air cooling.
- c) **Mechanical support system** should provide precise positioning of detector modules against each other and against the frame of reference. In addition it has to shield the detector modules from external light and front- end electronics from electrical interference.

2) Positioning system

A positioning system that will provide coordinates of the probe with respect to the PET system frame of reference will have to be incorporated. **I assume we will use one of the commercially available systems but I know nothing about them. Can Neal fill this in a bit?**

3) Interface

An interface that will allow connection of the probe to a standard PET system will have to be developed. It has to combine signals from the probe the scintillator ring. One of the main tasks of the interface will be to provide trigger data for events in which one of the annihilation photons will be detected in the probe and the other in the scintillator ring. This step will require information exchange with the manufacturer of the PET system. The consortium already established the first contacts with **Philips** with encouraging results.

4) Evaluation

The probe will be connected to an operational PET system and its performance will be evaluated. The initial tests will be performed on standard QC phantoms to determined improvement in spatial resolution and efficiency of the system with the probe. In the next stage the performance of a system with probe will be evaluated using anthropomorphic phantoms (**Paediatric, if paediatric PET phantoms exist. Neal probably knows that, if not people from Malmo should.**) While clinical tests on actual patients would be desirable the consortium feels that the available time will not be sufficient to obtain permission from the appropriate ethical commission. (This may not be the case if we do them in China.)