

**TITLE and type of activity (Networking, Joint Research development):
Join Research Development of new Neutron Detectors**

Leading beneficiary: Delft University of Technology

Partners: ISIS, ESS, NIKHEF, Amsterdam Scientific Instruments

Please do not forget evtl University partners!

Estimated budget (in person months, other direct cost) and tentative distribution per partner

60 person months, 80 KEuros direct investments, travel costs.

Abstract of your innovative activity: *(please make sure that you mention the following points)*

1. State of the Art

The most widely used neutron detectors use ^3He and have high efficiency, high noise discrimination but also medium position and time sensitivity. The shortage of ^3He and also the onset of new high brilliance neutron sources and new applications, such as high resolution imaging, make necessary to develop novel systems, which are based on alternative neutron detecting concepts and which can overcome the time/position limitations of common ^3He detectors.

2. What is new? Why should it be done on a European consortium level (synergies)?

Technologies commonly used in high-energy physics such as Hybrid pixel semiconductor detectors start being applied in neutron scattering and imaging instrumentation as well. Most if these developments took place within broad European collaborations lead by CERN, which also illustrated the importance of the synergies developed in such collaborations.

The objectives of this research are:

- 1) Development of very high spatial resolution detector based on the Silicon sensor coupled with neutron converter
- 2) Development of a Micro-channel plate based neutron imager
- 3) Development of new high spatial resolution, low cross talk and background wavelength-shifting scintillation detectors.
- 4) Development of new parallel readout electronics

3. How could your activity be connected with other methods and techniques (outside the neutrons community)?

New detection concepts has implications besides neutron instrumentation, as illustrated by the family of Medipix devices, which find a broad range of applications, from high-energy physics to materials science and medicine.

4. Is there any link with national initiatives/projects (e.g. national data initiatives, but also European roadmaps etc)?

The instruments at the ESS will require new neutron detectors.

5. How is the user community involved in your activity? Benefit for the user (evtl for any specific science community?)

This involvement is not obvious at the present state, as this is more a technological development.

