

**TITLE and type of activity (Networking, Joint Research development):
Network for Neutronics**

Leading beneficiary: ISIS

Partners: ESS, University of Madrid plus others

Please do not forget evtl University partners!

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

Not available at present. But we think this is a network rather than a JRA – so

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

1. State of the Art

The design of new neutron facilities within Europe is now underpinned by detailed computer calculations and simulations. ‘New facilities’ might be complete neutron sources such as the European Spallation source, or significant modifications to existing facilities such as plans to redesign the ISIS First Target Station target and moderator assembly; all the way through to individual neutron instruments at new or established sources – from construction of an entirely new instrument to upgrades of existing ones.

Computer simulations are used at all these levels to predict the behaviour of neutrons as they are created, moderated, transported, manipulated, scattered and detected. These ‘neutronics’ calculations underpin the design of targets and reflectors, moderators, beam transport elements such as guides and choppers, instrument detector configurations and final instrument performance. They allow optimisation of components in response to the scientific needs of the research community.

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

These simulations are now a critical and integral part of neutron facility design. Each neutron facility has some expertise in performing neutronics simulations – but there is much to gain by facilities sharing expertise and good practice, and in acting as reviewers or critics of simulations performed at individual facilities. Such shared expertise and capability would allow design improvements for future neutron sources.

We would like to establish a network, including the temporary exchange of personnel, between neutron facilities in Europe to enable the sharing of expertise in neutronics simulations. Collaborations already exist between individual facilities – such as between ISIS and ESS. We would like to see expertise shared across European facilities, together with collaborative activity established between facilities to take specific projects forward which require neutronics.

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

It may be possible to link this to those doing simulations and instrument design for other techniques such as for x-ray synchrotrons.

Also to note . . . this may link to other neutron activities such as moderator engineering, operational assurance for facilities, etc.

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

Clear link to ESS design; design of ISIS target station 1 modifications

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

Eventual benefit for the user community is better European neutron sources, optimised for the science requirements.