Minutes of the „spontaneous working group on imaging with fast neutrons“ meeting during WCNR-11

Participants:

E. Lehmann (organizer) – PSI
J. Hunter – LANL
M. Tailor – Phoenix
A. Stowe -
B. Walfort – RCTritec
V. Geppert-Kleinrath – LANL
T. Bücherl – TUM
M. Johnson – LLNL
B. Soubert – ETHZ, PSI
B. Schillinger – TUM
M. Schulz – TUM
S. Zimnik – KIT, TUM
R. Zboray – EMPA
P. Trtik – PSI
A. Craft – INL
N. Bazin – AWE
S. Miller – RMD

1. Aim of the meeting

The number of related contributions to the conference is much higher than in meetings before – indicating an increased interest in fast neutron imaging (FNI). Limitations in the performance w.r.t. sensitivity, spatial resolution and adequate instrumentation were found out. The demand for the inspection of bulky objects with reasonable transmission and resolution is obviously high.

The participants can be grouped as following: scintillator manufacturer (RC Tritec, RMD); facility operators (TUM, LLNL; partly PSI, ETHZ, KFKI); potential system installer (Phoenix, UK,).

It was stated by R. Zboray that meetings about fast neutron applications were held in the past, the last one in Israel. The follower in China was canceled due to low participation. However, these meetings were not focused on FNI alone. The output of these meetings indicates no break-through.

A new developed screen by RC Tritec was found useful and best performing w.r.t. efficiency. Little potential for improvements might exist possible.

The major issue is the improvement in spatial resolution yet. Recent studies by V. Geppert-Kleinrath show options for improvements – but also the limitation due to the cross-talk of the light spread and of the recoil proton distribution. There are already some fiber bundle approaches done, e.g. via PTB

in Braunschweig, but they were limited in the efficiency again, as shown in measurements at NECTAR.

Since the problem of limited spatial resolution is obvious, but not resolvable for the moment, the following conclusions were made:

1. Creation of a mail exchange list of the WG FNI
2. Collection of "state of the art" imaging data from previous investigation, including the conditions of the acquisition – key point E. Lehmann, PSI
3. Preparation of the dedicated Workshop on FNI, to be held in Munich-Garching in the first half of 2019 – key point M. Schulz. Support by IAEA Vienna will be asked for by E. Lehmann.
4. In the meantime, measurements of test scintillator specimen can be performed at the underutilized facilities NECTAR (TUM) and in LANL. A direct link between the sample owner and facility manager can be established via the mailing list.
5. In particular, the two manufacturing companies (RMD, RC Tritec) consider in-house available new/old test samples for further considerations.

Sydney, September 5th, 2018 – before 18:00

For the notes: E. Lehmann, PSI