

## 5.15. Mr Frikkie De Beer (South Africa)

### *Introduction*

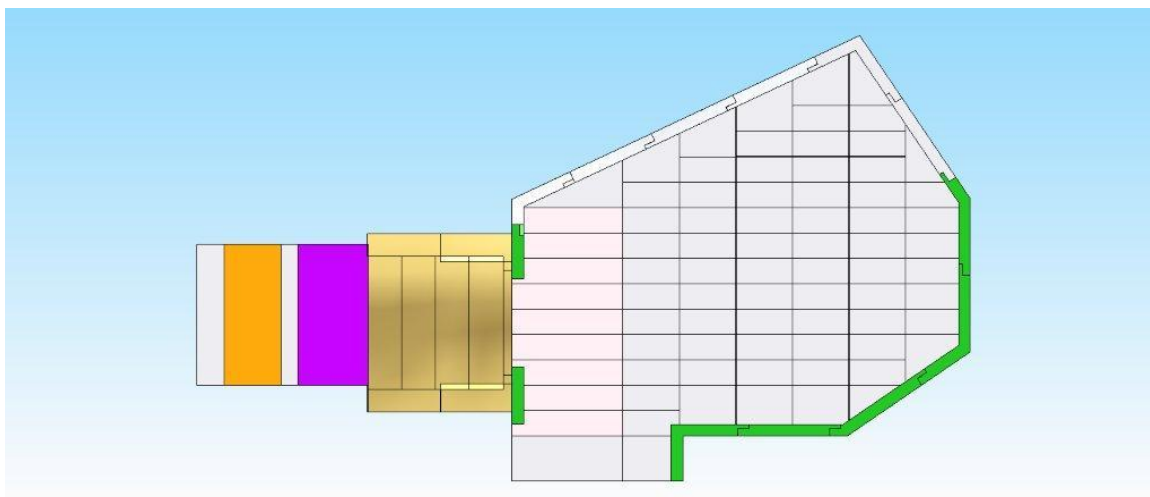
South Africa has a rich cultural history with ample opportunities for Neutron Imaging to be applied in Archaeological and Palaeontological studies as depicted in the references. Through this collaboration the NI and CH communities are united to introduce neutron induced Autoradiography of paintings as new analytical technique to South Africa. The outcome is foreseen to be a database on NI techniques and applications in CH as well as an exhibition at a museum to showcase the scientific collaborations.

### *Experimental facilities*

The SAFARI-1 Nuclear research reactor with the SANRAD facility located at beam line #2, main parameters are:

- Thermal neutron beam flux :  $10^7$
- with L/D = 125 and

Field of View of 25cm x 25cm. Andor Camera with Neutron sensitive Scintillator screen in light tight box and rotation table completes the imaging infrastructure. Will be in operation till June 2012 and upgraded till July 2013. A new upgraded facility will be in operation from July 2013 – a schematic layout (Top View) of the new facility is being depicted in the figure below.



### *Cooperation:*

The following Cooperation within the scope of the CRP is being envisaged:

- Database: All participants of CRP and all NI facilities globally
- Autoradiography: Helmholtz Berlin : Dr. Nikolay Kardjilov and FRMII – Garching: Dr. Burkhard Schillinger.
- Tomography: Helmholtz Berlin : Nikolay Kardjilov and FRMII – Garching: Burkhard Schillinger.
- PSI: David Mannes
- Museum exhibition: DITSONG museum group in South Africa, Leon Jacobson & Dirk Oegema

*Workplan year 1-4:*

Year 1 - The establishment of an International database on the International Society for Neutron Radiology website: ([www.ISNR.de](http://www.ISNR.de)) on:

- Current approved and available neutron imaging methods applied in Cultural Heritage samples
- Available and characteristics of available neutron imaging facilities for cultural heritage studies
- Literature and references of work reported in previous international Conferences on the subject
- Imaging results of recent publications on cultural heritage samples.

Year 2 - The establishment of an Auto-neutron-radiography capability in South Africa through:

- Theoretical and methodological knowledge transfer from Germany on:
  - Preparation of samples-specially on paintings
  - Neutron scanning
  - Evaluation instrumentation set-up
  - Evaluation techniques and principles
- Practical hands on demonstration at existing facilities overseas for practical knowledge transfer
- establishment of an instrument list to manufacture and install similar and functional infrastructure at the SANRAD facility in South Africa.
- Preliminary investigations on paintings:
  - Development and Manufacturing of phantoms for calibration and standardization.
  - Exposure of phantoms and evaluation
  - Report on findings – especially the critical safety aspects in terms of safety and possible damage to paintings
- Application of neutron tomography and Autoradiography on: Rock art samples, Gold plated artefacts, Glass, Palaeontology samples, Other Archaeological samples
- Planning of Museum exhibition.
  - Determination of needed infrastructure through liaison with the museum community.
  - Planning of museum exhibition layout.
  - Purchasing of necessary infrastructures.

The detailed 3 year workplan for autoradiography and the database can be found in the separate working groups