ODIN Rescoping

Starting Point

Descoping on ODIN (at TG2) included:

- 1. High resolution imaging detectors
- 2. X-ray imaging capabilities
- 3. Diffraction detector(s)
- 4. Grating interferometry (NGI)
- 5. Time-of-Flight Three Dimensional Polarimetric Neutron Tomography (ToF 3DPNT)
- 6. Spin Echo Modulated Dark Field Imaging (SEMSANS)

ODIN Rescoping

Discussion & Conclusion during Open Discussion

Discussion Items: Detectors are key for the success of neutron imaging. A lot of development around novel event mode detectors (example LumaCam) – ESS should exploit the possibilities and bring imaging detectors to diffraction beamlines and also consider to use that technology for diffraction detectors. Agreement that key to success for any of the modalities is dedicated personnel.

1. High resolution imaging detectors

Should receive highest priority. Can nowadays be done at lower cost than anticipated at TG2 (infinity corrected optics approach).
A dedicated setup is preferable (instead of rebuilding the standard detector each time; that means a dedicated camera).

- 2. X-ray imaging capabilities

Source and detector already funded from external grant covers. But mechanical integration still missing – ESS should provide the resources to enable this. ESS Science Director supportive of that idea.

- 3. Diffraction detector(s)

The event mode imaging system (LumaCam) can be used as diffraction detector (see https://doi.org/10.1107/S1600576724004448).

- 4. Grating interferometry (NGI)

Crucial for several scientific applications for ODIN. Hardware not that expensive. But needs dedicated personnel. Collaborate with e.g. TUM and PSI.

- 5. Time-of-Flight Three Dimensional Polarimetric Neutron Tomography (ToF 3DPNT)

Will enable new and unique scientific applications for ODIN and can make use of long pulse. Needs dedicated personnel.

- 6. Spin Echo Modulated Dark Field Imaging (SEMSANS)

While this is a technique with high potential. Probably the lowest priority among the list for ODIN (for now).

- 7. High Flux TOF Neutron Imaging Detector

While event mode imaging with TPX3cam is extremely powerful; it is currently limited by maximum flux. The next generation (TPX4cam) should overcome this or the proven MCP detector should be considered. Otherwise ODIN cannot make use of its flux.

Comments by Diffraction & Imaging Division

Neuwave-12, Lund, 03 September 2024

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Discussion & Conclusion during Open Discussion

Discussion Items: Detectors are key for the success of neutron imaging. A lot of development around novel event mode detectors (example LumaCam) – ESS should exploit the possibilities and bring imaging detectors to diffraction beamlines and also consider to use that technology for diffraction detectors. Agreement that key to success for any of the modalities is dedicated personnel.

1. High resolution imaging detectors

Item 3.2 in rescoping document. Planned to be procured by division budget. (70kEuro without dedicated camera; 270kEuro with dedicated camera)

Should receive highest priority. Can nov s approach).
A dedicated setup is preferable (instead of rebuilding the standard detector each time, that means a dedicated camera).

- 2. X-ray in

Not included in rescoping document. Supported by RAC and division budget. (160kEuro)

Source and d chanical integration still missing – ESS should provide the resources to enable this. ESS Science Director supportive

- 3. Diffraction detector(s)

Item 3.3 in rescoping document. Option 1: Traditional diffraction detector solution: 1.5 Meuro. Option 2: Event mode imaging camera solution: 250 kEuro

The event mode imaging system (LumaCam) can be used

- 4. Grat

Not included in rescoping document. HW procured division budget. (50kEuro)

Crucial fo Hardware not that expensive. But needs dedicated personnel.

- 5. Time-of-Flight Three Dimensional Polarimetric

Item 3.4 in rescoping document. Polarimetric setup + development: 600 kEuro

Will enable new scientific applications for ODIN and

- 6. Sp

Item 3.5 in rescoping document. SEMSANS setup + development: 400 kEuro

While t t priority among the list for ODIN (for now).

- 7. High Flux TOF Neutron Imaging Detector

Item 3.1 in rescoping document. MCP detector: 220 kEuro (TPX4cam not yet available)

While event mode imaging with TPX3cam is extrem next generation (TPX4cam) should overcome this or the proven MCP detector should be considered. Otherwise ODIN cannot make use of its flux.