

Installation, alignment and access strategy

Håvard Gjersdal

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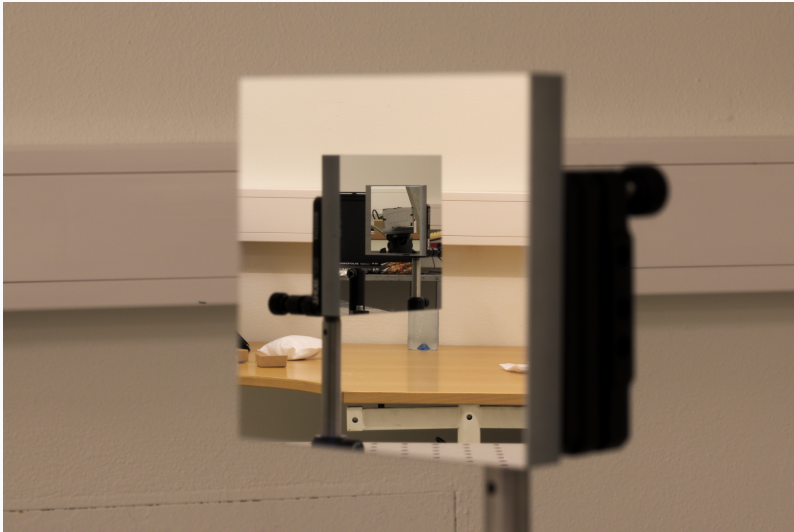
University of Oslo

Full path will never be accessible. System must be installed and aligned in steps:

1. Mirrors will be installed in PBIP (Horizontal)
2. PBIP mirrors will be aligned in the mock-up
3. PBIP will be moved from mock-up to monolith
4. Alignment will be verified
5. Rest of system will be installed, full system will be aligned

The strategy has been developed in dialogue with ESS Target and ESS Bilbao.

The full alignment procedure will be discussed during prototype visit.



Compatibility test

- Test of interfaces in the PBIP at ESS Bilbao as soon as possible
- Make sure mirrors with mounts are compatible with plug, and can be centered on apertures
- This is not a formal part of acceptance tests of PBIP
- Oslo will bring all necessary equipment, as well as manpower.

Installation of mirrors in PBIP

Location	Time	Duration
ESS Hall	Mid 2019	Two weeks

- Mirrors will be installed in the PBIP when the plug is laying horizontally
- This is first time we have a chance to test the alignment process in the actual PBIP. Full alignment procedure should be tested.
- M1 will be mounted on a temporary, adjustable mount.
- Need access to all mirrors, full optical path.
- Need access to optical path near object and M5 for placing alignment equipment/targets.
- For final alignment, we will need a quiet shift.

Alignment of the mirrors in the mock-up

Location	Time	Duration
Mock-up	Mid/late 2019	Two weeks?

- The plug is not perfectly rigid, mirror angles will change when plug is vertical.
- Alignment will be adjusted.
- Need access to all mirrors.
- Need access to part of the optical path for placing alignment targets.
- Full path to object will not be available for PBW. We will need full path for TW system.
- Need access for placing alignment equipment near the nominal position of M5.
- For final alignment, we will need a quiet shift.

M1 will have zero degrees of freedom in order to maximize thermal connection to PBIP.

- The interface surface to M1 will be surveyed.
- Full system will be aligned with M1 aligned on adjustable mount
- The aligned position of M1 will be surveyed
- A custom mount will be made at UiO, shipped to ESS
- Two weeks for this process may be a little tight.

Verification of PBIP alignment in monolith

Location	Time	Duration
ESS	Soon after PBIP installation	One day

- Camera and illumination system will be placed at M5
- Must verify that the tilt of the PBIP is sufficiently small, and that we can recover the optical path
- Must have access to M4, and be able to adjust it

Installation and alignment of full system

Location	Time	Duration
ESS	After PBIP installation	One week

- M5, M6, M7, camera, and illumination system will be installed.
- We need access to M4-M7 interfaces
- Need access to the table in A2TAA and in the connection cell.
- Must be able to survey the shield wall aperture and the vacuum window.
- For final alignment, we will need a quiet shift.