

FREIA costing and delivery for Detectors

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Baseline detector for FREIA is the Multi-Blade B-10 based gaseous detector
ref: <http://iopscience.iop.org/article/10.1088/1748-0221/12/03/P03013/meta>

Costing has been agreed at the Scope Setting meeting (2016/10) and following to discussion with H. Wacklin, C. Lopez, R. Hall-Wilton, J. Nightingale and F. Piscitelli.

It was agreed that the instrument presented as configuration 2 in the scope-setting report will form the basis of the scope and budget for FREIA.

The full detector of 300x300mm² will be built, but electronics will be provided only for the central 200x250mm², resulting in a cost saving of about 110 k€. This active area is sufficient for early operations and can straightforwardly be upgraded to the full physical area.

The detector will be made up of 30 units (cassettes) of 130x300mm² each. They will be positioned at a fixed distance from the sample (3m) over a circle. Spatial resolution will be 0.5x2.5mm² and efficiency 45% at the shortest wavelength (2.5Å).

Costing for detector was agreed to be ~650kEUR. Cost includes manpower and the delivery of the detector with front-end (FE), back-end (BE) electronics and cables. Detector includes the vessel.

The costing is preliminary and might be subject to revision, figures are indicated in the range +0% -25%.

Costing:

Coatings: 30 Ti-blades 130x300mm² – 1.2m² – **16kEUR**

Electronics: 1k wire channels + 2k strip channels = 3k channels

Cost per FE channel 100EUR

FEE cost 300kEUR

BEE cost 200kEUR

Total: **500kEUR**

Channel number goes to 2k if less area is read out, saving ~110kEUR

Mechanics: **190kEUR** (includes blades, PCBs, vessel, testing, assembling, housing, gas, cables, cooling, ...)

Installation: **34kEUR**

Cold commissioning: **27kEUR**

Total: ~770kEUR (saving ~-110kEUR if less area is read out: ~650kEUR)

Manpower is considered in all costs.

Note: Costs like housing and services can be included in other costs and might be double counted.

This Detector offer is based on 'turnkey' delivery, including installation, delivery and cold-commissioning of the Detector on the instrument.

The Detector has an expected lifetime of 10 years.

ESS quote: ESS invoices instrument project.

ESS labour rates "cost book values" used

Present Unknowns:

- Interface dependent with vessel.
- Details of pressure interface between detector and instrument tank (vacuum, or ...)
- Mechanical envelope: detector size +15cm (i.e. 500x500 needs 650x650x400mm)
- Specifications have not been value engineered and are quoted "as is"