

Tentative and preliminary schedule of detector installation - DP

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Infrastructure

Assumed availability of the shaft and some space to stock material.
Considered no limitations from manpower, logistic and material delivery.

Major construction in situ:

Clean room, Crane, Cold boxes.

Clean room mainly used for manipulation and tests of the CRPs.

Clean room will be equipped with:

- openable roof for the SAS material
 - openable roof for TCO closure
 - movable overhead crane
 - cold boxes and required cryogenic installation
 - possibly a tests stand for the light detectors (it can be done on surface)
- need for buffer/storage space underground

CRP

The entire installation is driven by the CRPs test and installation.

CRPs arrive with some degree of QA and QC.

Test of the mechanical and electrical behaviour in double phase argon is fundamental.

CRP handling after the test must be minimised (e.g. in NP02 the CRP3 had three wires broken during transport).

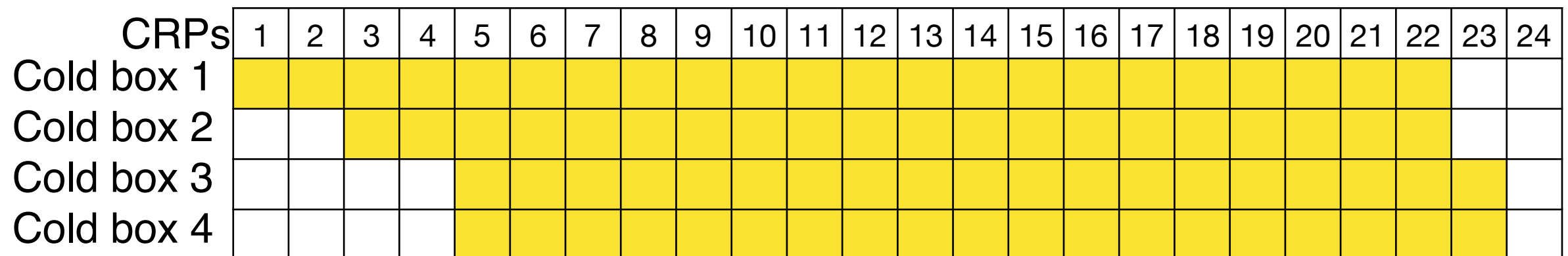
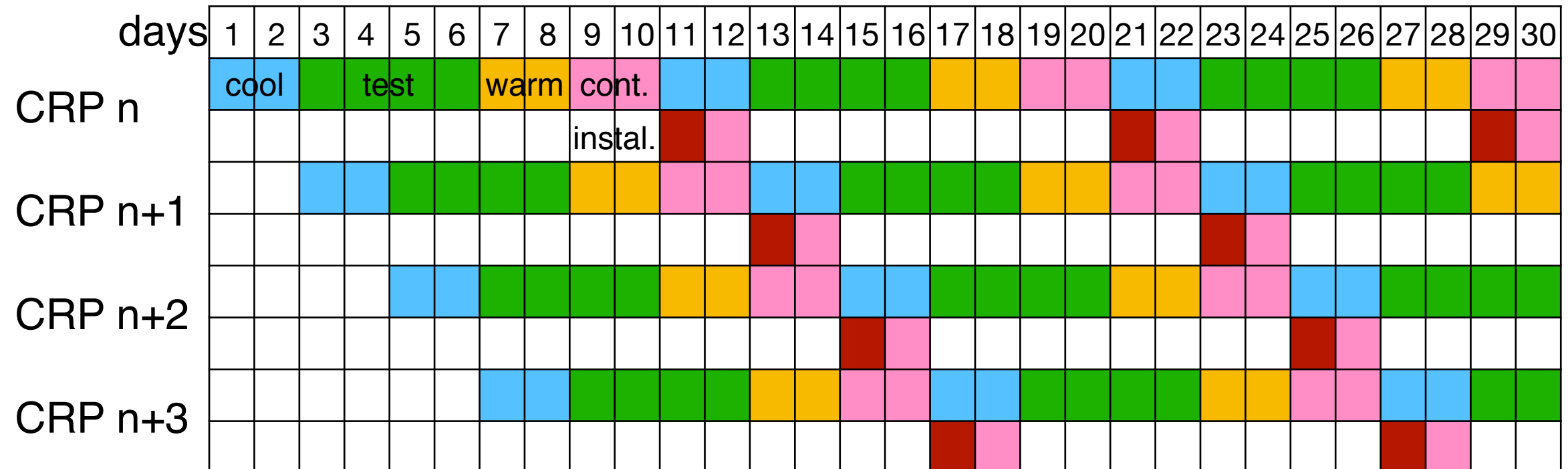
CRP test cycle (10 d):

- purge, cool down, and fill -> 2 d
- test -> 4 d
- emptying and warming up -> 2 d
- contingency -> 2 d

Four cold box to parallelise the tests. Two possibilities considered

CRP functionality test

Implies a storage tank to recover the argon from the cold boxes

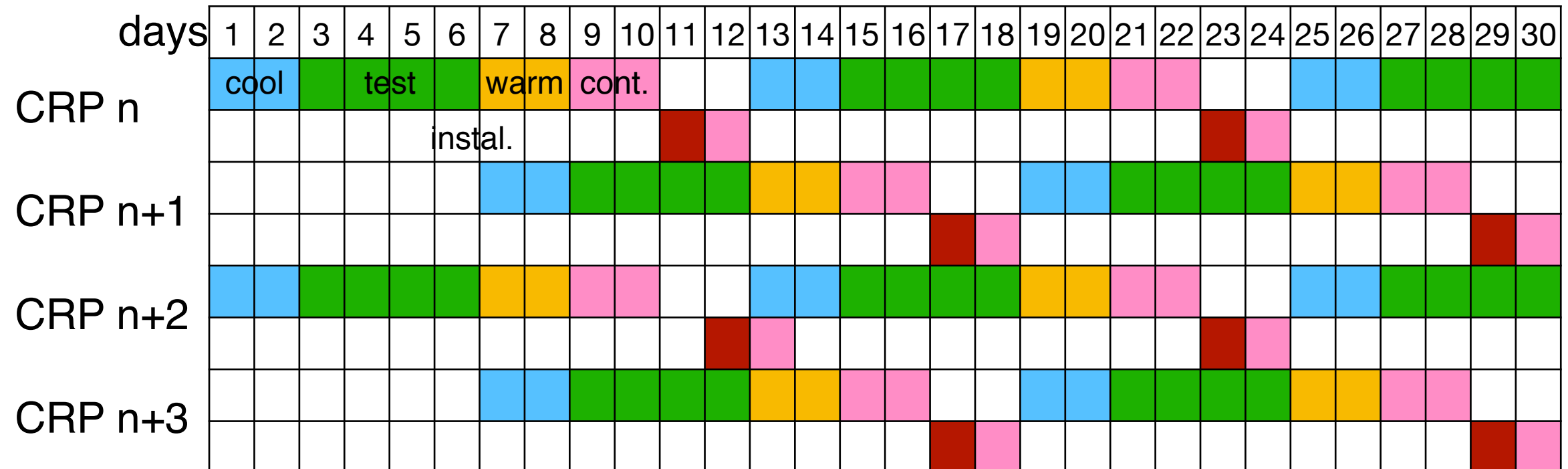


In steady state and with four cold boxes, 12 CRP/month tested

In about 33 weeks (7 day/week) all the 80 CRPs can be installed

CRP functionality test

Use the argon from one cold box to the other



| CRPs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Cold box 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Cold box 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Cold box 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| Cold box 4 | | | | | | | | | | | | | | | | | | | | | | | | |

In steady state and with four cold boxes, 10 CRP/month tested

In about 39 weeks (7 day/week) all the 80 CRPs can be installed

Field cage and cathode

Field cage: long super-modules (12 m?) constituted by sub-modules constructed inside the cryostat. Installation “lift and hang” à la NP02.

Cathode: 12 m wide sections minimising metal components used only to ensure mechanical strength and longevity. Construction inside the cryostat and hanged from the field caged bridging the long sides.

Ground grid: metal modules laying on the membrane.

Field cage should be installed while CRPs are installed.

Cathode, ground grid and photosensors can be installed meanwhile.

Pro: speed up the installation process

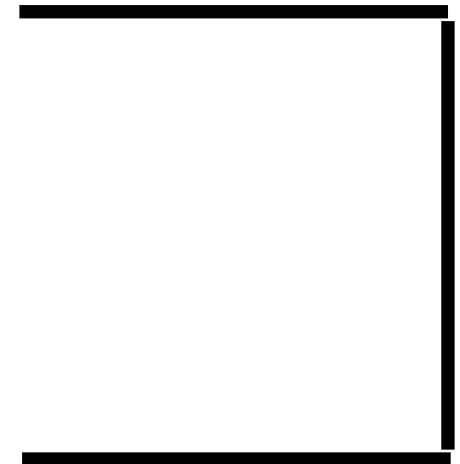
Cons: no access to CRP already installed

Previous schedules allows to build the field cage and cathode in the cryostat and install them in parallel to the installation of the CRPs

This scenario is considered as baseline.

Sequence

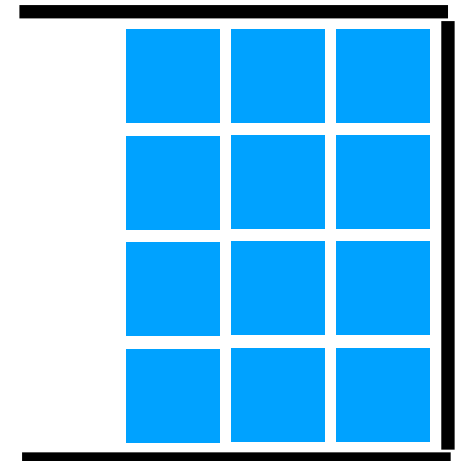
Field cage
and cathode
assembly



Sequence

1-2 months

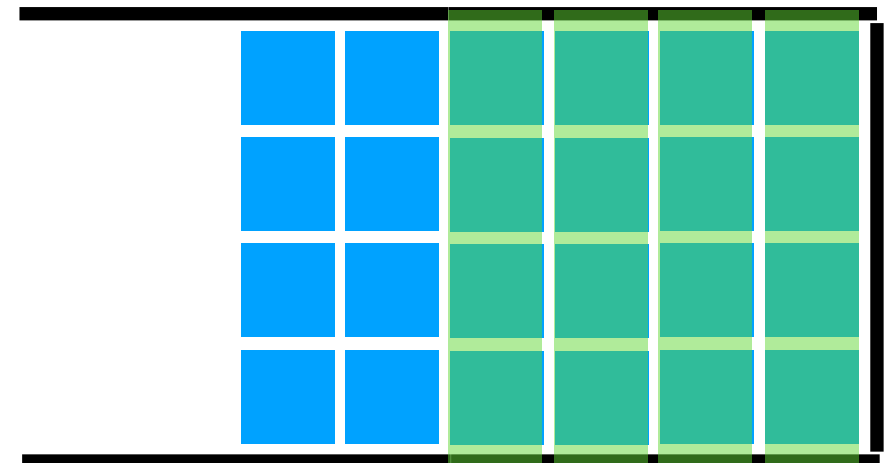
Field cage
and cathode
assembly



Sequence

3 months

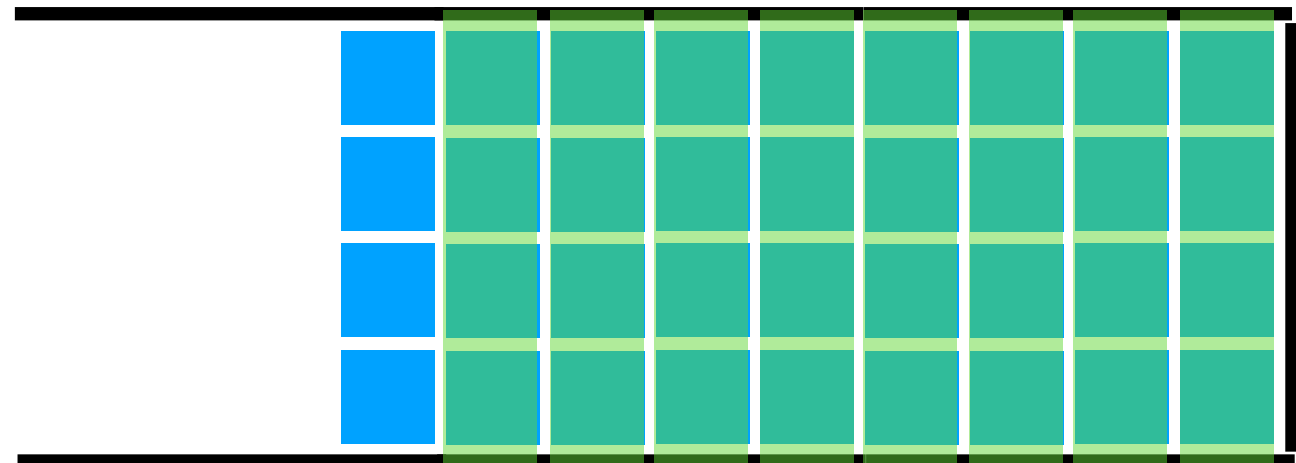
Field cage
and cathode
assembly



Sequence

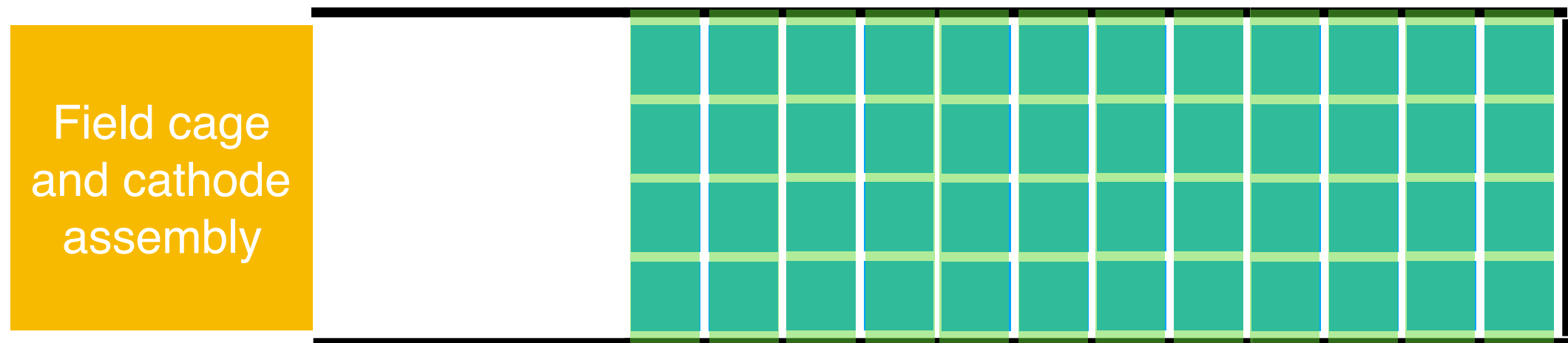
4 months

Field cage
and cathode
assembly



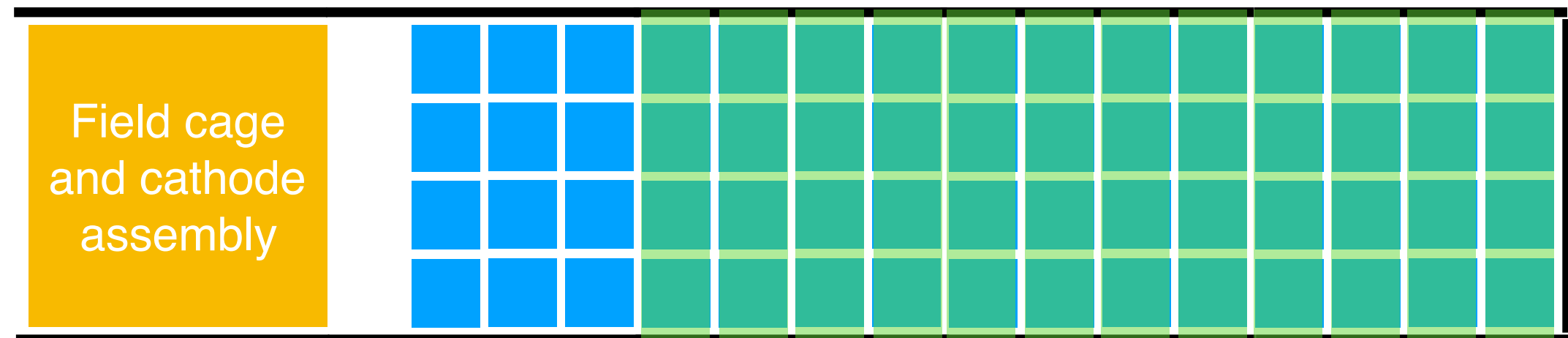
Sequence

5 months



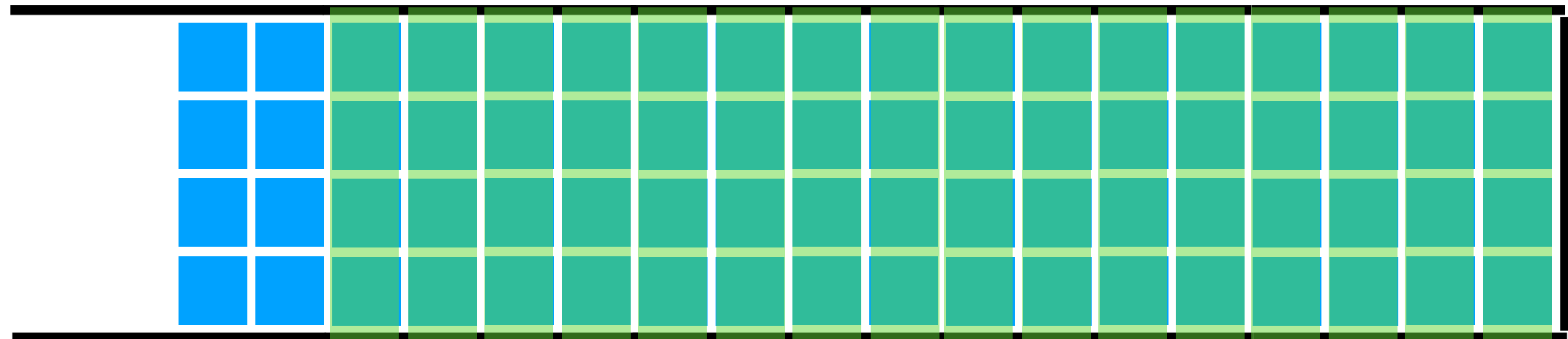
Sequence

6 months



Sequence

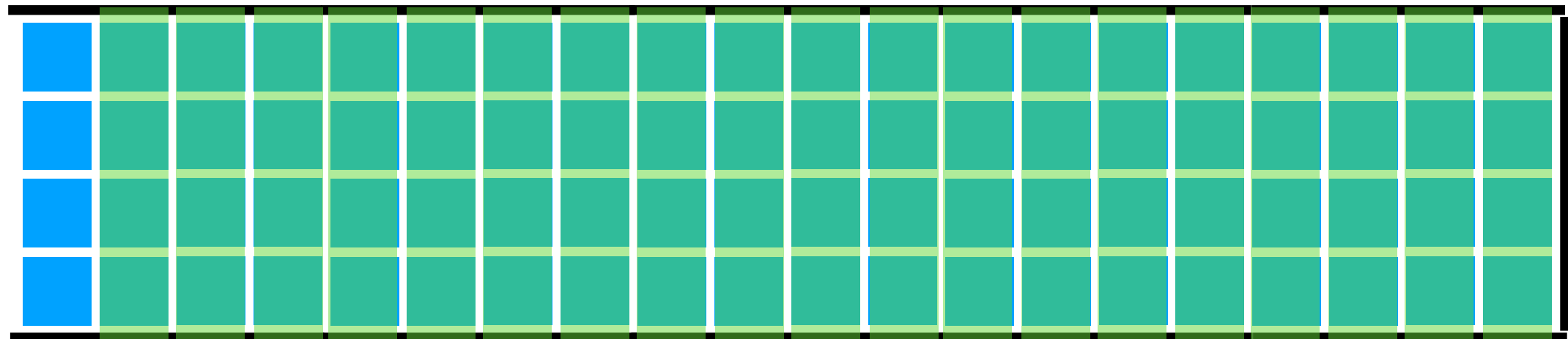
7 months



Sequence

8 months

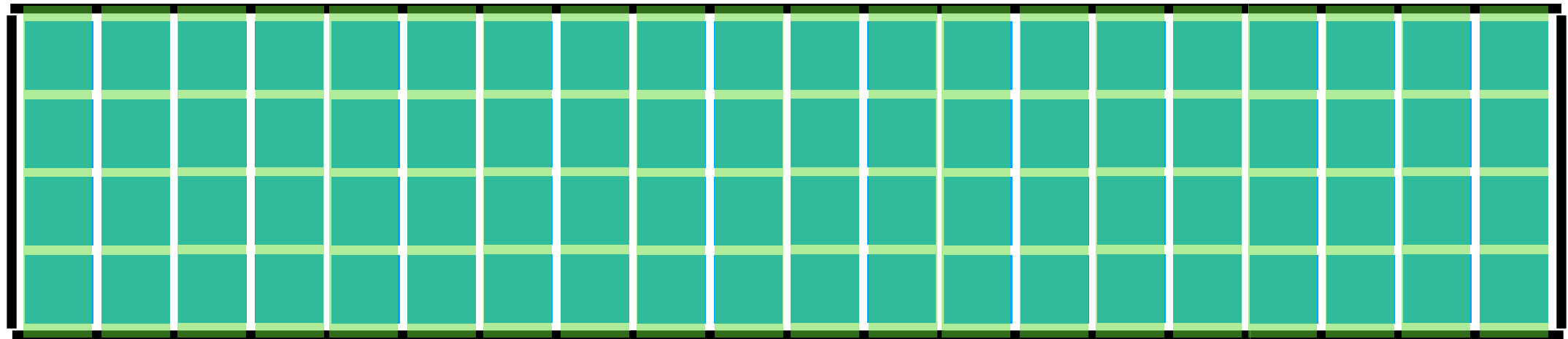
2 months?
Closing
the TCO



Sequence

1 months?

Conclude the TPC



Installation

Warm cryostat structure
Cryostat insulation & membrane
Cryogenics and piping

Clean room, Crane, Cold boxes, Cleaning stations, Testing stations, false floor, ...

Field cage

Cathode VHV feedthroughs

Ground grid

Photon-detectors

Instrumentation

TCO closure

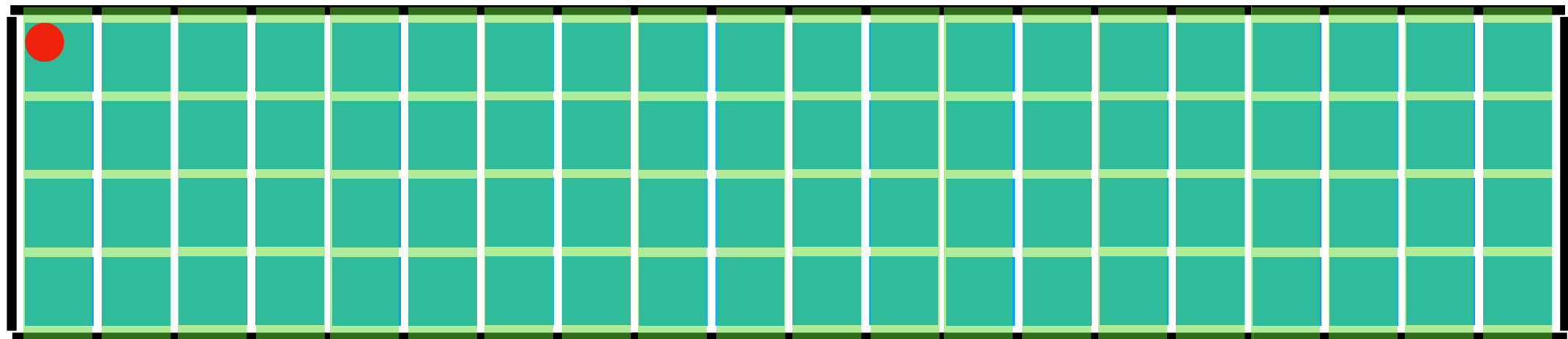
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For discussion...

VHV feedthrough and cathode connection?

Resistive cathode?



18x 3.2 m long CRPs?