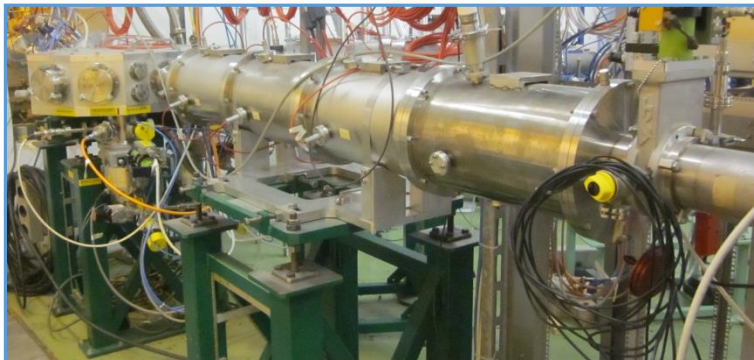


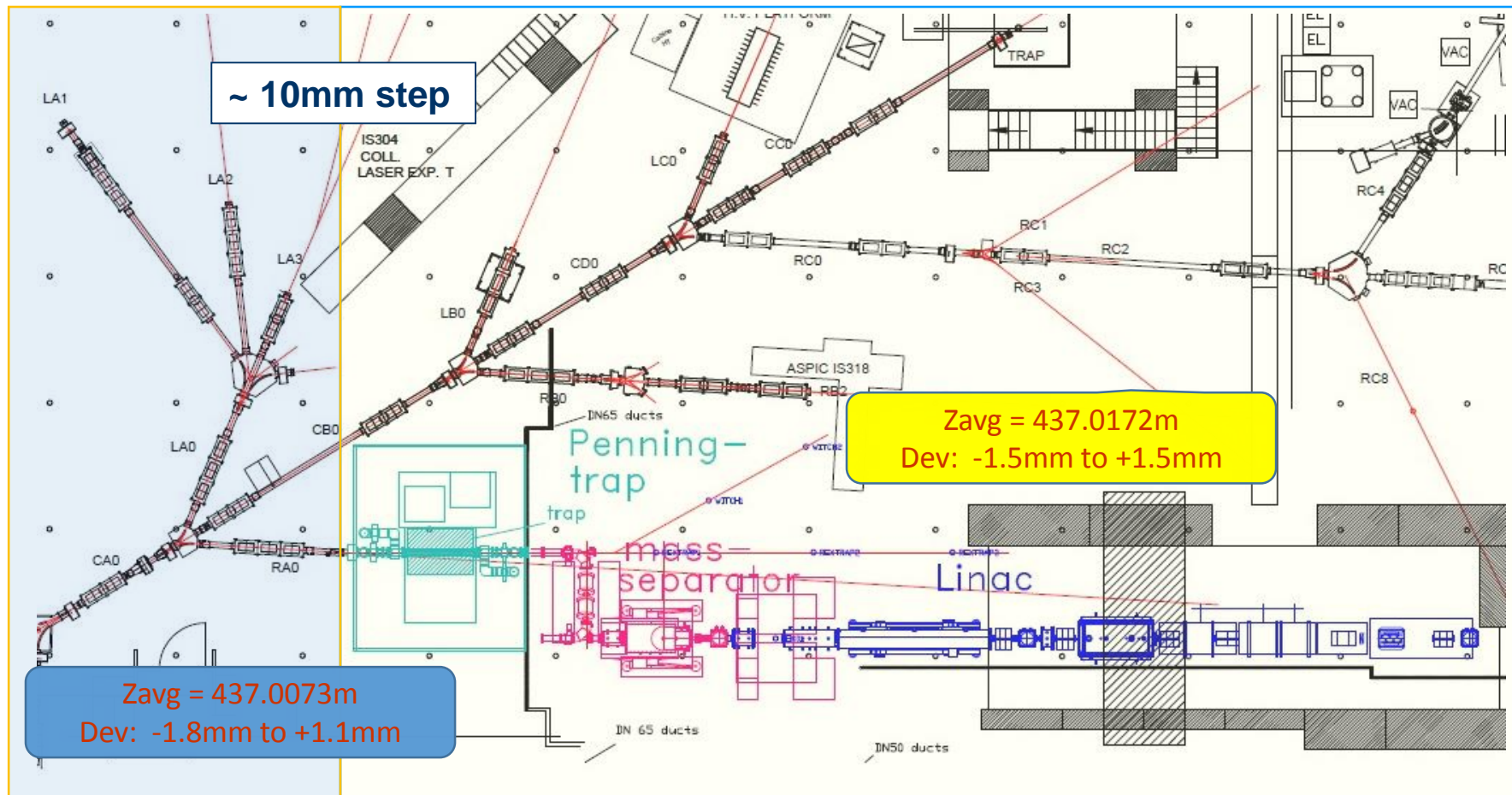


# ***ISOLDE Lines - Survey Results***

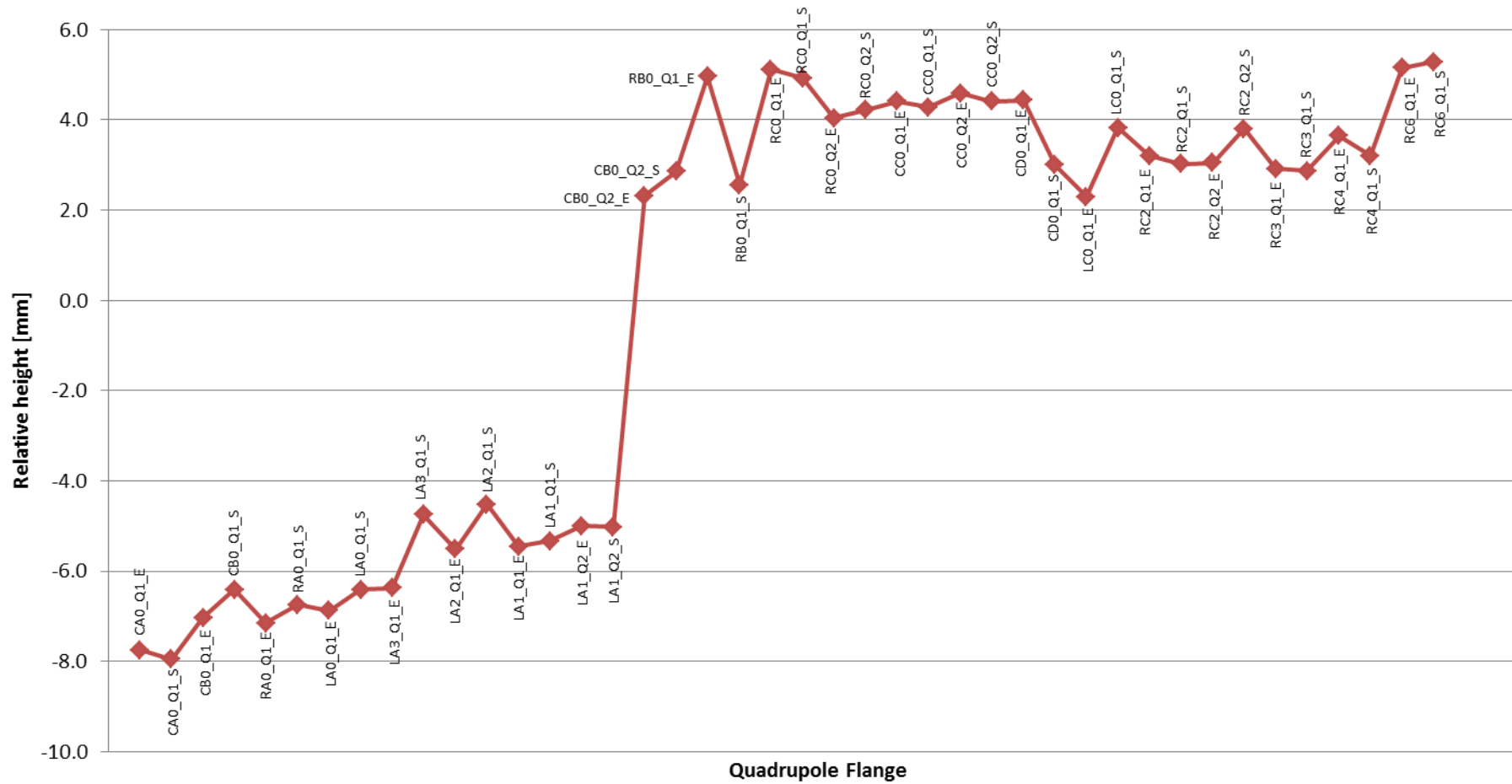
***Measurements of  
November/December 2012***



# RESULTS – vertical plane



# RESULTS – vertical plane





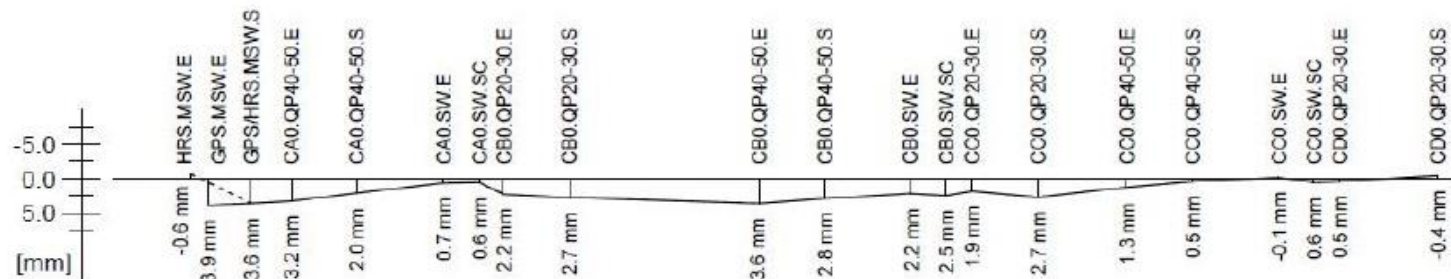
**ISOLDE MAIN LINE:**

Horizontal Offset from the Theoretical Beam Line

Scale along the beam: 1 : 100

Horizontal offset scale: 1 : 1

Co-ordinate System



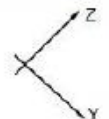
**ISOLDE MAIN LINE:**

Vertical Offset from the Theoretical Beam Line

Scale along the beam: 1 : 100

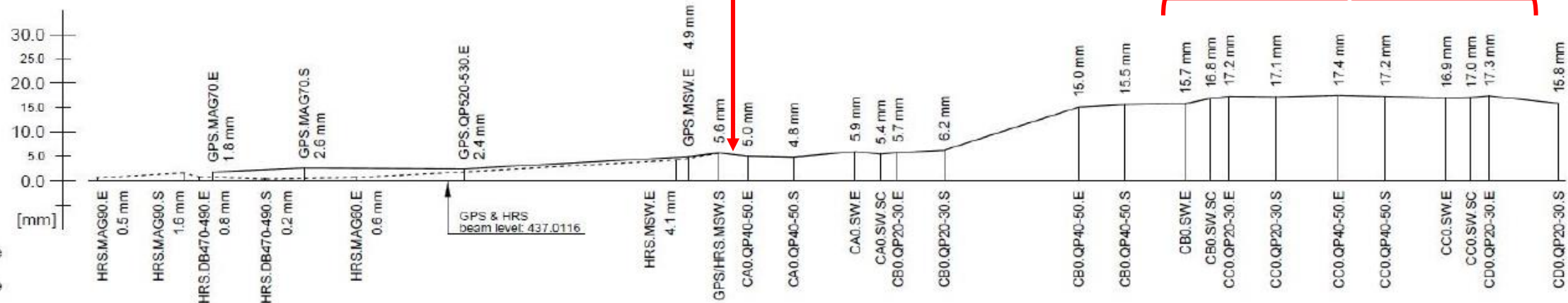
Vertical offset scale: 1 : 1

Co-ordinate System



REX + GLM/GHM  
+ LA beamlines

CRIS, COLLAPS, ISOLTRAP, VITO etc



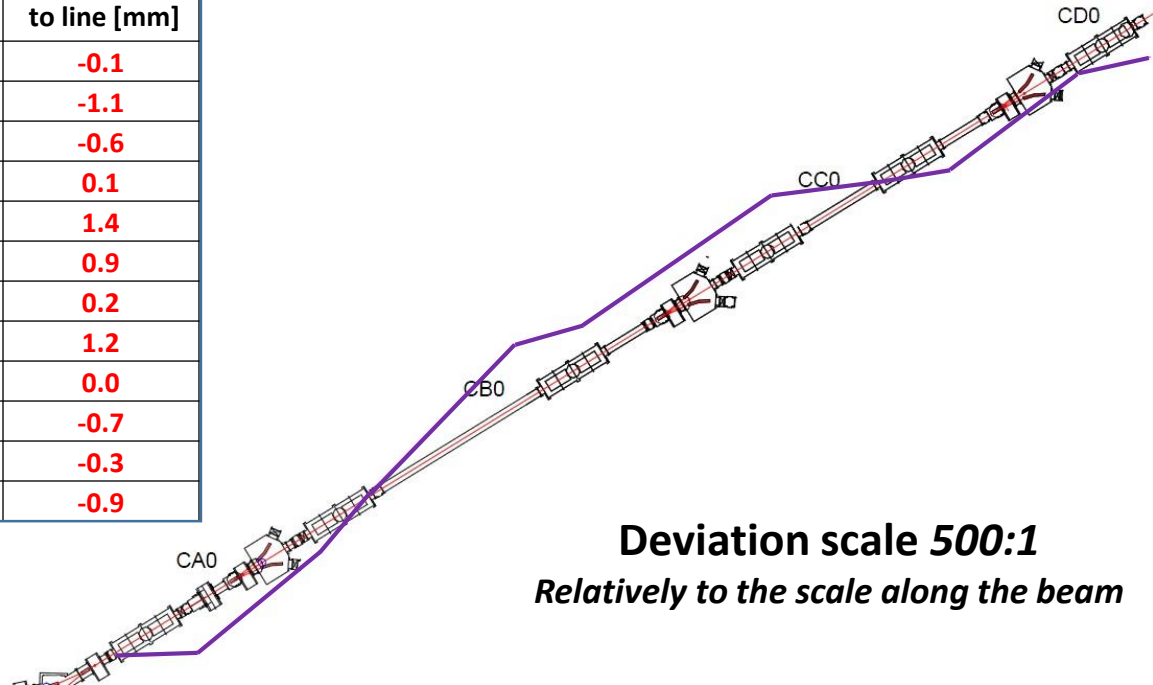
# RESULTS – horizontal plane

## main line CA0 – CD0



Line: **CA0-CB0-CC0-CD0** Bearing [g]: **351.4005**

Name	X [m]	Y [m]	Distance to line [mm]
CA0_Q_E	1879.3962	2239.1236	-0.1
CA0_Q_S	1878.7661	2239.7807	-1.1
CB0_Q1_E	1877.3575	2241.2535	-0.6
CB0_Q1_S	1876.7272	2241.9131	0.1
CB0_Q2_E	1874.9036	2243.8206	1.4
CB0_Q2_S	1874.2733	2244.4785	0.9
CC0_Q1_E	1872.8599	2245.9545	0.2
CC0_Q1_S	1872.2301	2246.6140	1.2
CC0_Q2_E	1871.3751	2247.5059	0.0
CC0_Q2_S	1870.7443	2248.1640	-0.7
CD0_Q1_E	1869.3341	2249.6383	-0.3
CD0_Q1_S	1868.3920	2250.6219	-0.9



**Deviation scale 500:1**  
*Relatively to the scale along the beam*

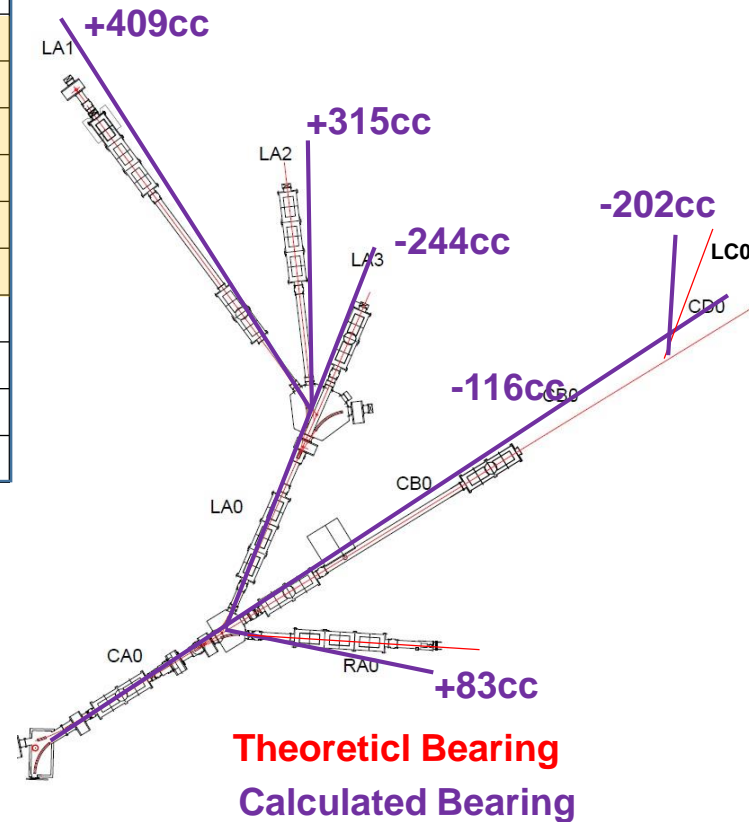
# RESULTS – horizontal plane

## bearings comparison



Line	Theoretical Bearing	Calculated Bearing	Difference Calc-Theo
	[g]	[g]	[cc]
CA0-CB0-CC0-CD0	351.4121	351.4005	-116
LA1	245.8565	245.8974	409
LA2	279.1898	279.2213	315
LA0-LA3	312.5232	312.4988	-244
LC0	312.5232	312.5030	-202
RA0	390.2997	390.3080	83
RB0	390.3010	390.2699	-311
RC0-RC2-RC6	390.3010	390.2941	-69
RC3	29.1899	29.1670	-229
RC4	323.6343	323.6108	-235

10cc ~ 0.16 mm/10m



# Transmissions

- **SSP (GLM/GHM/LA1/LA2):**
  - no real issues reported (GLM and GHM are not in the re-alignment zone anyway; no serious issues for LA1). LA2 hasn't too much recent data: but the last few tests to the tape station were OK.
- **COLLAPS**
  - From GPS or after RFQ on HRS they report **100%**.
  - More of an issue through RFQ, then the transmission is (from 2017):
- **CRIS:**
  - No update received, but no serious issues from last year.
- **ISOLTRAP:**
  - Would be very happy not to have a re-alignment campaign. Their tunes are satisfactory and the extra work required to facilitate realignment would be very heavy on the collaboration. Transmission through cooler can be a problem.
- **IDS/NICOLE:**
  - Typical transmission: 60-80% from GPS to the chamber. Transmission worse for low energy beams and dependent on ion source (which is usual). Tuning times can be long, especially when autotune is not working.
  - Quite some losses at the switchyard feeding IDS/NICOLE. This is being looked at locally; supports require re-doing.
  - Many issues with mass factor on GPS. IDS seems to be the most sensitive to this; hasn't been such a problem for LA1 e.g. during same beam time: perhaps some elements going to IDS are more sensitive to this.
- **VITO:**
  - Essentially 100% transmission after RFQ to the beginning of VITO; ~50% through their own beamline. They prefer no realignment of the beamlines.

Element	HT (kV)	Trans %
Rb	50	57
Sn	50	60
39K	40	68
39K	30	68
23Na	30	61
27Na	30	61.5

RFQ Cooler transmission has been more of a problem rather than beamline transmission

# Risk analysis

Consequence	catastrophic	2	2	3	3
	major	1	2	3	3
	moderate	1	2	2	2
	insignificant	1	1	1	2
		rare	possible	likely	frequent

## Risk Categories

1 - time

2 - cost

3 - schedule

4 - environmental

5 - personnel

Likelihood



# During alignment process

Risk	Risk cat.	Cause	Consequence	Mitigation	Rate
Radiation levels too high	Time Personnel	Separator areas and underestimated time required	Delay ~ 1 month	Re-evaluate intervention	1
Contamination of participants and surroundings	Time Personnel Environment	Opening vacuum confinement – unknown radiological inventory	Delay ~ 2 months - reclassification of hall - decontamination	Re-evaluate intervention process and use PPE	1/2
Inability to maintain vacuum	Time Cost	Damage to equipment/surfaces	Delay ~ 1–12 months	Replace parts or equipment	2
Inability to re-align experiments with new beam line height	Time Cost	No margin for re-alignment	Delay – re-alignment objective not attained	Mechanical modification of experiment/re-iterate alignment plan	1/2

# Risk analysis after alignment\*

Risk	Risk cat.	Cause	Consequence	Mitigation	Rate
Impossible to attain previous transmission	Time Schedule Personnel	Fiducialisation not conform-	Poor experiment setup. Potential hot spots along beam line	Fiducialize different components – remake certain components	2
Impossible to attain previous transmission	Time Schedule	BI no longer correctly positioned	delay	recalibrate mechanical position of BI	2
Impossible to attain previous transmission	Time Schedule	unknown	Delay and inability to return to original position	Return to original alignment	2
No beam transmission	Time Schedule	elements outside electrostatic range	Difficult to diagnose - delay	Change power supplies	2

\* Can only be tested with beam. i.e. as from ~September 2020

# Questions

1. To do or not to do?
2. Shall we provide MADX simulations to surveyors this year?
3. Shall we verify current alignment this year?