Status of the REX/HIE-ISOLDE Beam Commissioning

Jose Alberto Rodriguez

on behalf of BE-OP-ISO and the HIE-ISOLDE project

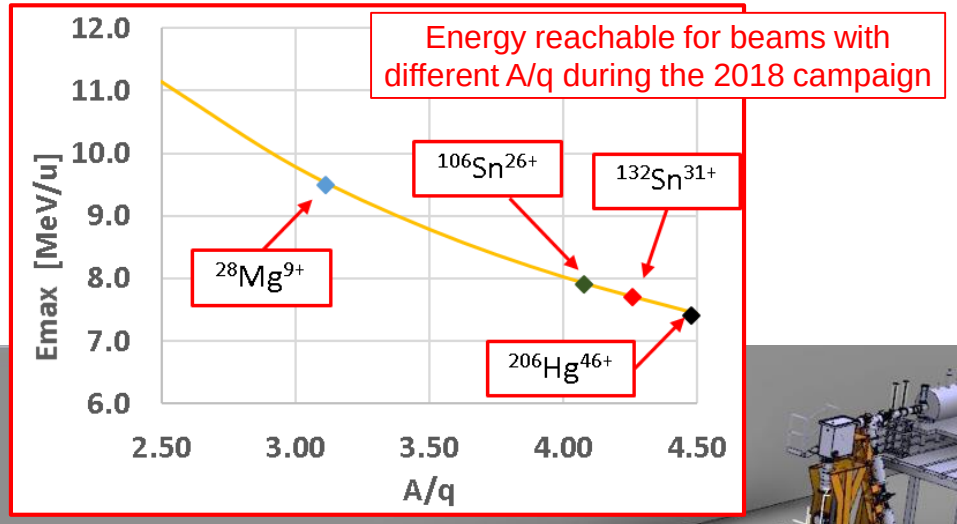
Outline:

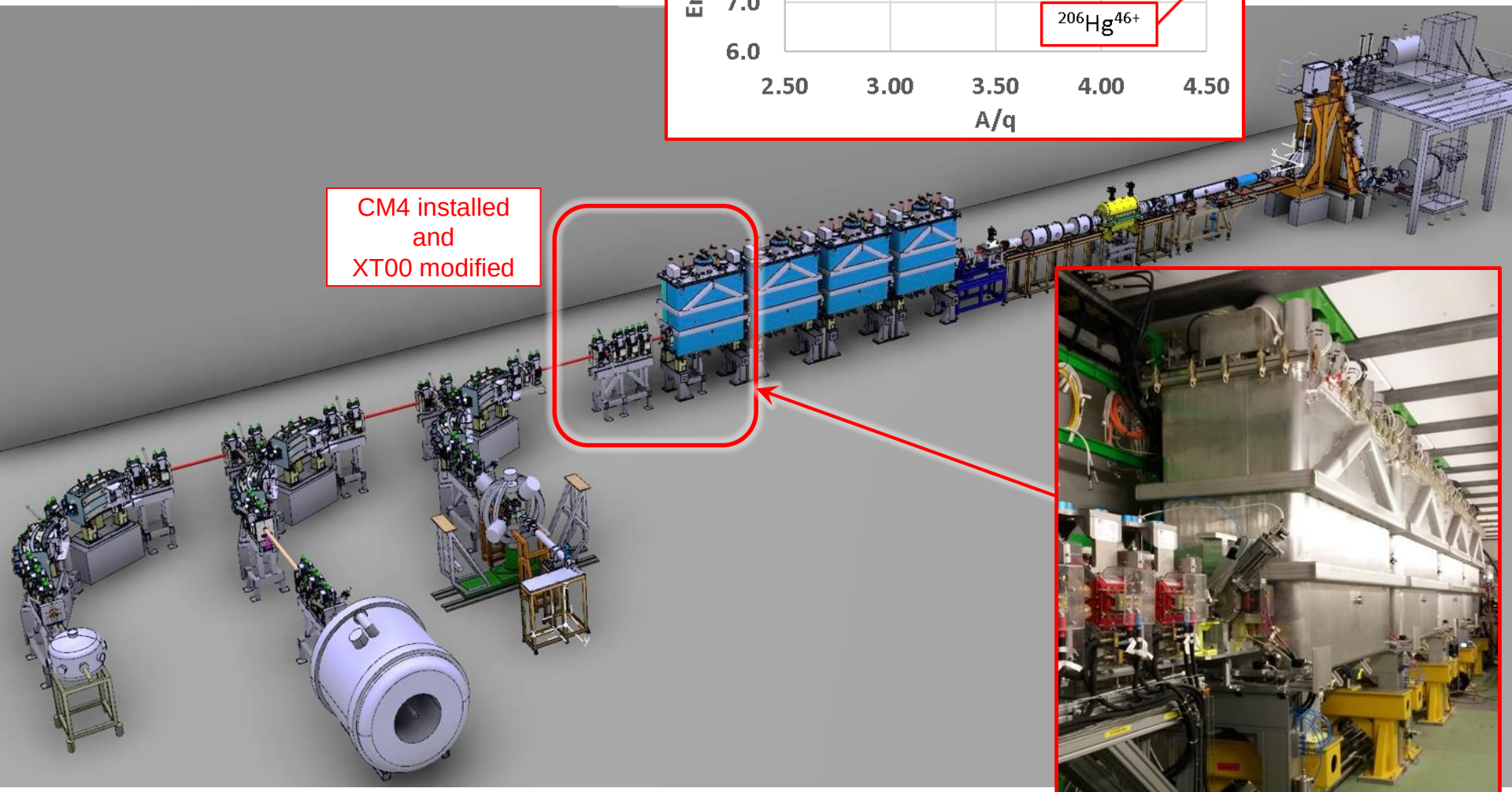
- Introduction
- Machine Checkout
- Beam Commissioning (completed)
- Beam Commissioning (pending)
- Summary

Introduction:

Phase 2B of HIE-ISOLDE operational:

- Additional cryomodule (CM4)
- Modification of the XT00 line





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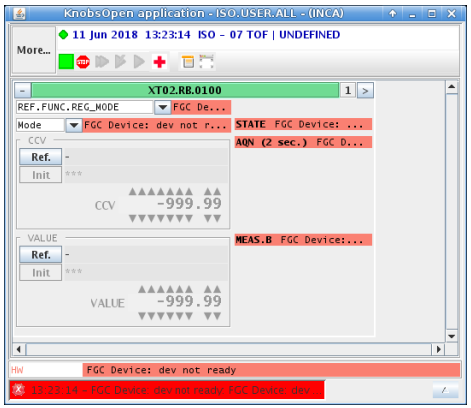
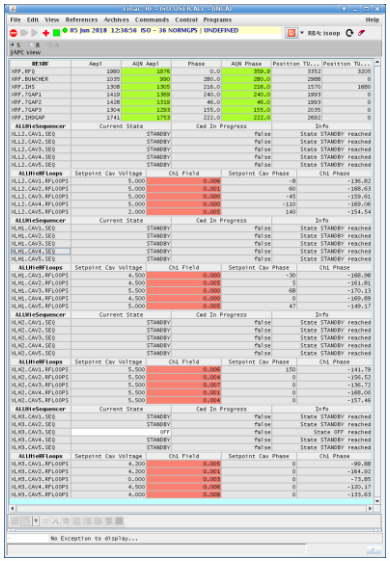
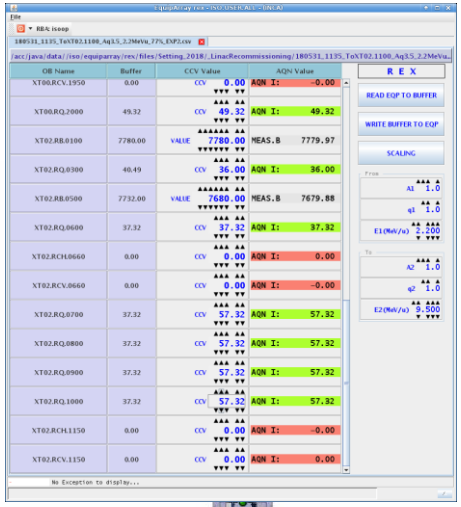
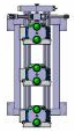
Machine Checkout:

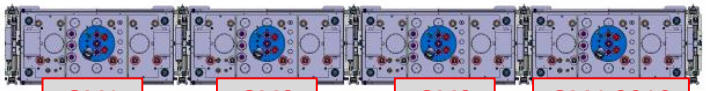
Wk.	Main activities:
20-21	**Machine checkout tests:** ➢ Power converters ▪ New FGC_63 low-level control software (power converters for the HEBT dipoles) ▪ Field regulation (dipoles) ▪ Automatic degaussing (XT01.0100, XT02.0100) ➢ Updated working sets and equipment arrays (RF, LINAC, EXP1, EXP2, EXP3) ➢ Beam instrumentation (hardware, low and high level controls, noise level…)

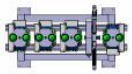




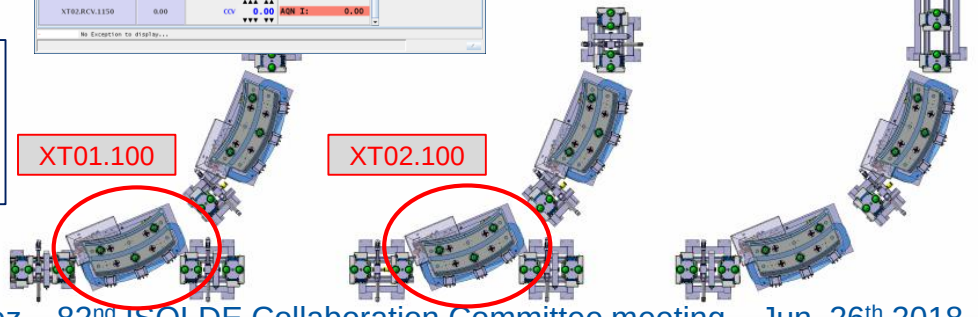








End Tunnel



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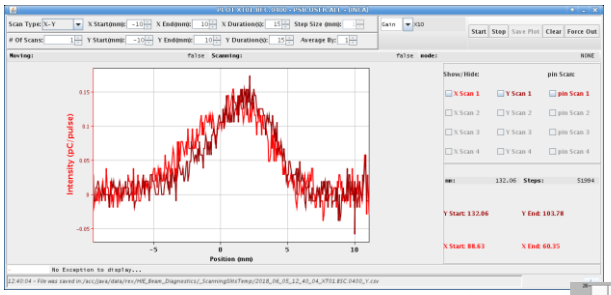
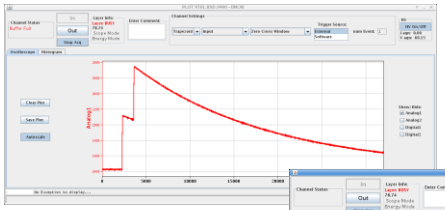
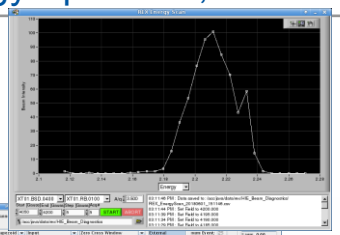
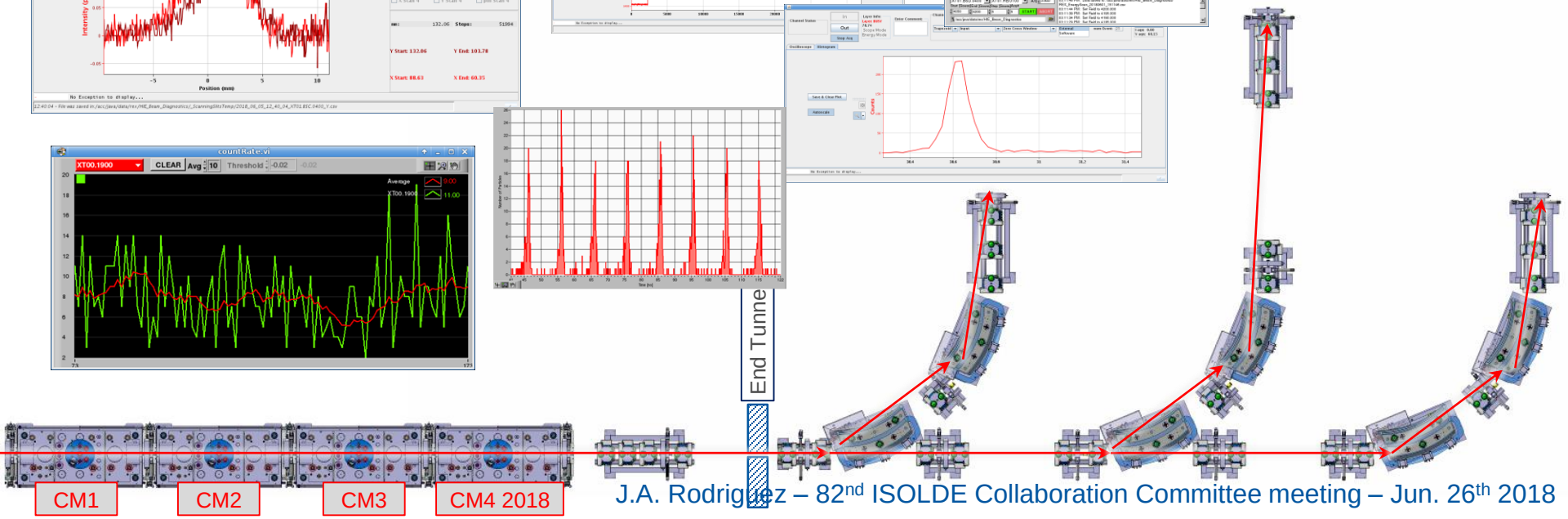
Beam Commissioning (completed):

Wk.	Main activities:
22	**Beam Commissioning (end of hardware commissioning on May 29th):** ➢ First beam drifted through the cryomodules ➢ Tests of all FCs, scanner slits and optics elements (except for users' FCs) ➢ Set up for $^{14}N^{4+}$ at 2.2 MeV/u to the end of XT01, XT02 and XT03 (transmission: 74%, 77% and 77%) ➢ Tests of the Si detectors (XT00.1900, XT00.1050, XT01.0400) ➢ Tests of OP's high level applications (Count Rate, Energy Spectrum, Bunch Length, Beam Energy)



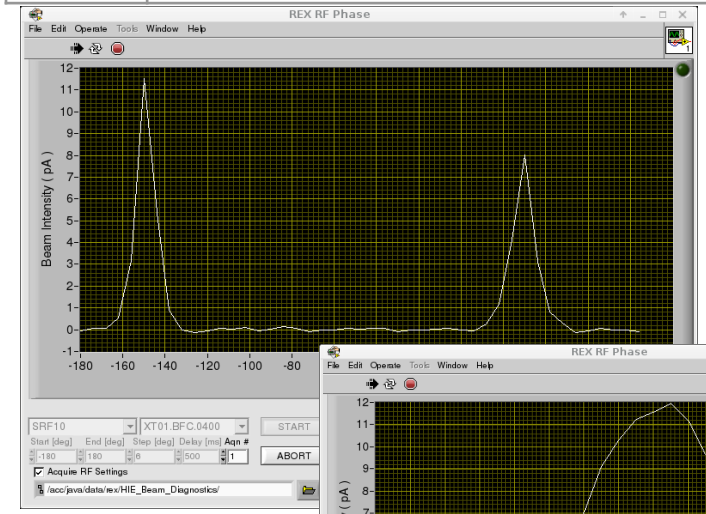


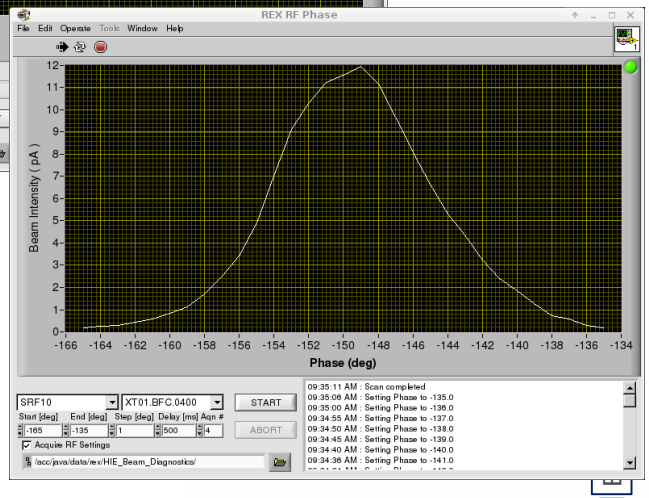


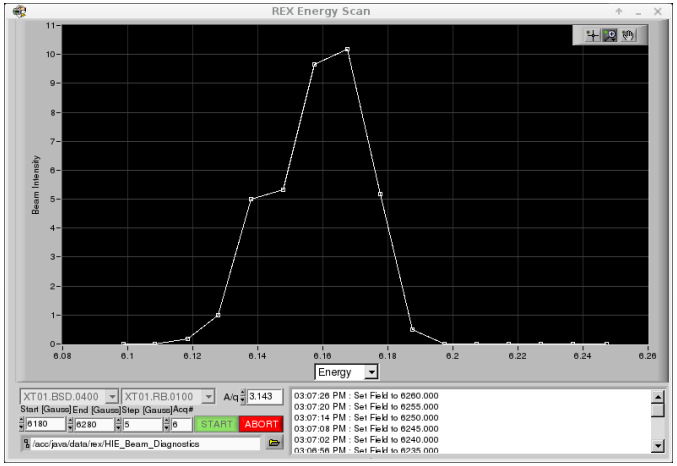


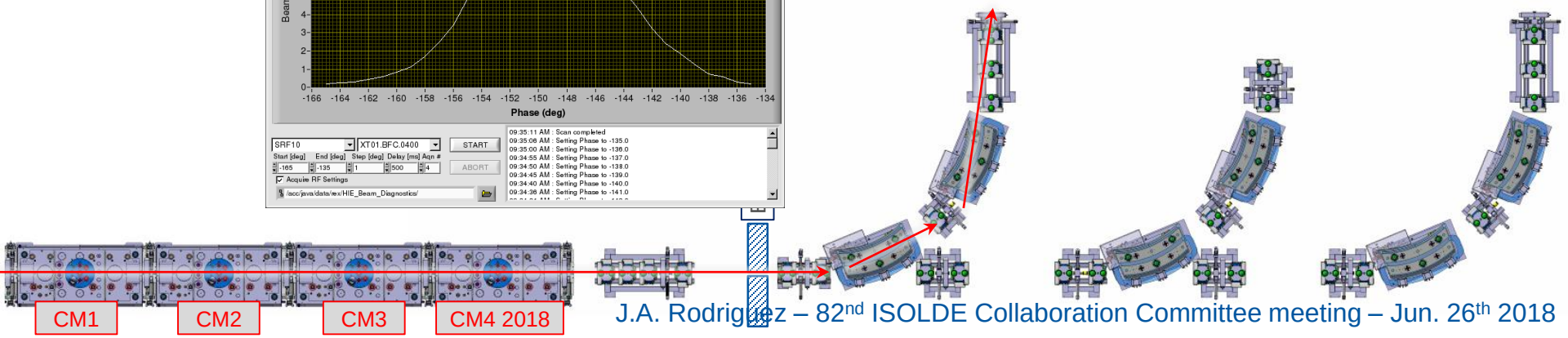
Beam Commissioning (completed):

Wk.	Main activities:
23	➢ Phasing of the 19 operational SRF cavities ➢ Set-ups for $^{12}C^{4+}$ and $^{22}Ne^{7+}$ at 9.48 MeV/u to the end of XT01 ➢ Slow extraction tested and applied ➢ $^{22}Ne^{7+}$ at 6.16 MeV/u (10 cavities) to Miniball for the weekend on Friday at 15:00 (65 hours)



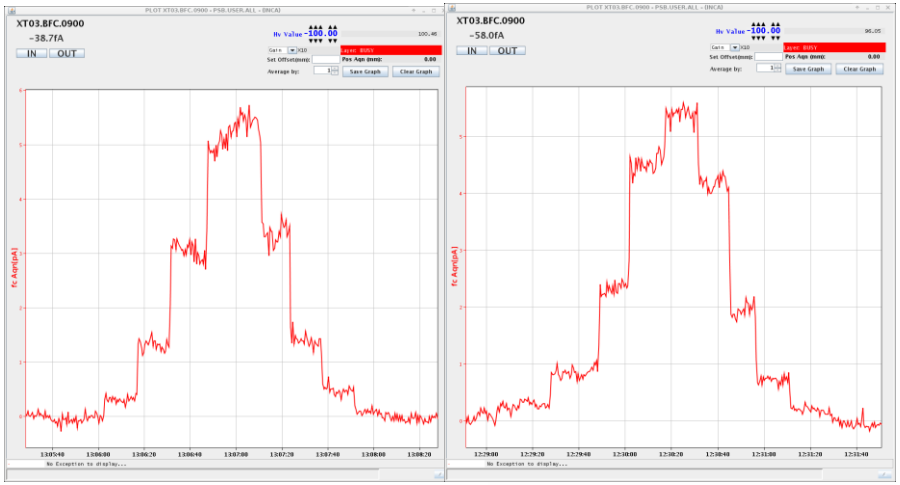


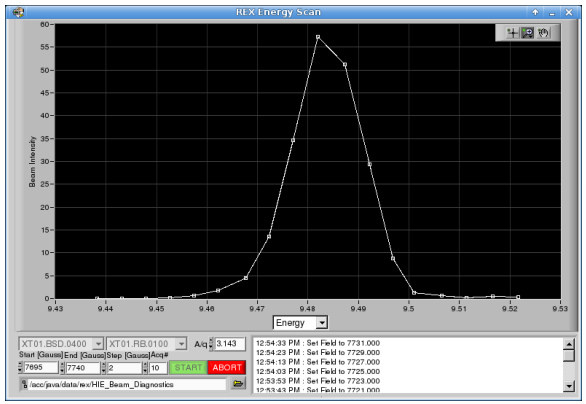


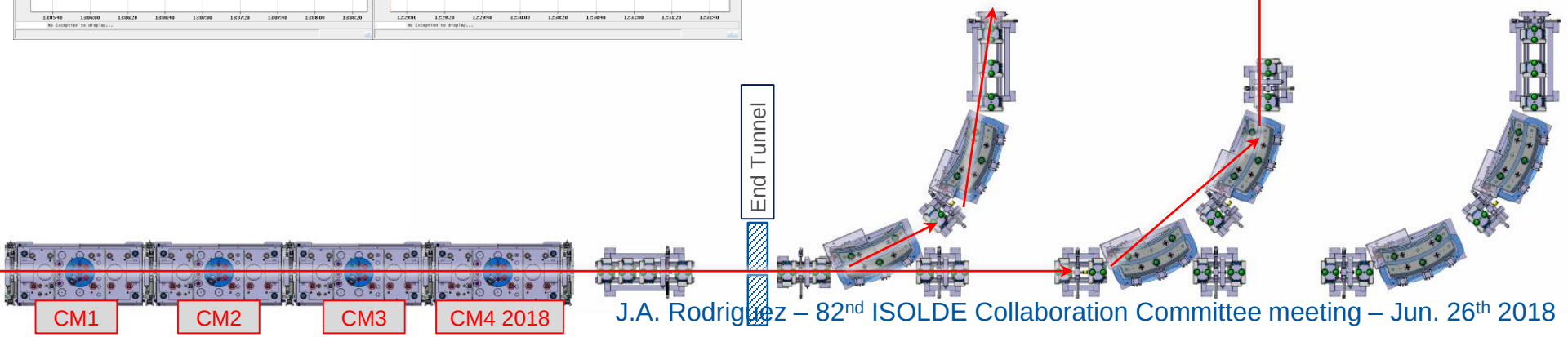


Beam Commissioning (completed):

Wk.	Main activities:
24-25	➢ Problem with SRF19 quickly solved by our LLRF and SRF colleagues ➢ Set-up for $^{22}Ne^{7+}$ at 9.48 MeV/u to the end of XT02 ➢ Beam-based calibration for SRF20 (data not analysed yet) ➢ $^{22}Ne^{7+}$ at 9.48 MeV/u to ISS at 2.47 T from Wed. at 10:30 to Mon. 18:45 (~99 hours) ➢ Scheduled ABP MD on GPS/REX-TRAP/REX-EBIS ➢ Set-up for A/q=4.0 at 7.44 MeV/u to XT01.0400







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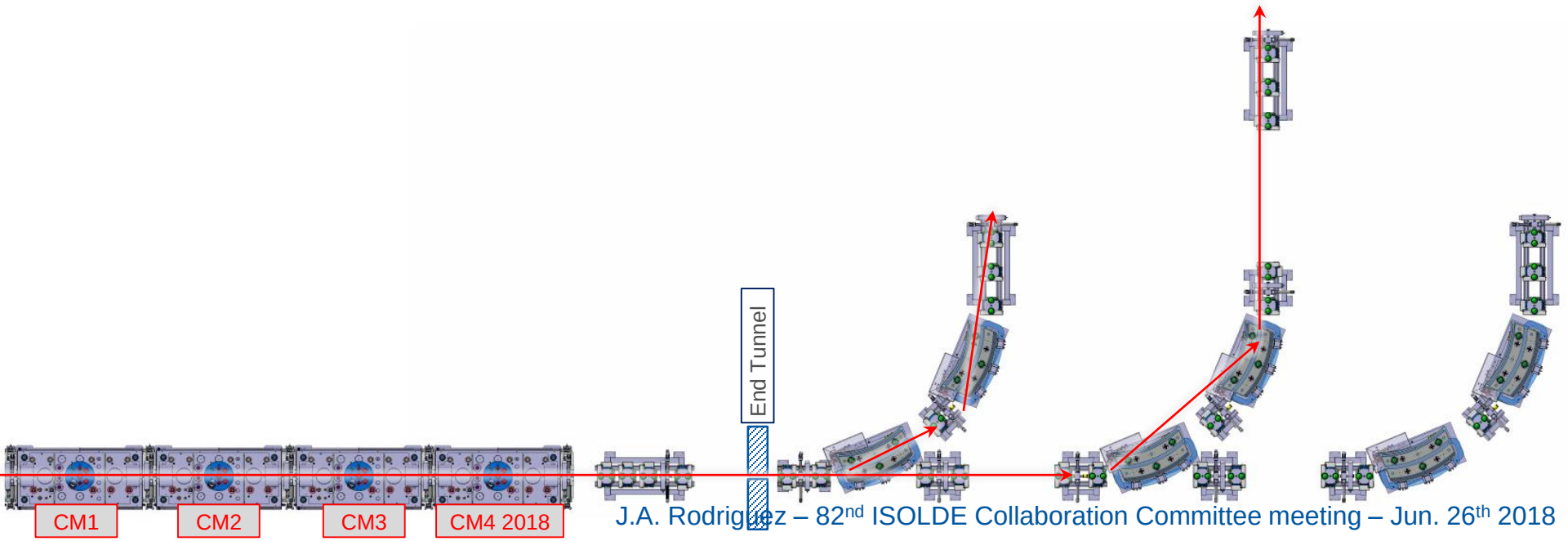
Beam Commissioning (pending):

Wk.	Main activities:
26	➢ ^{39}K from Ion Source to REX-TRAP, REX-EBIS and REX/HIE-ISOLDE linac (completed N. Bidault) ➢ Automation software tested (completed N. Bidault) ➢ Transverse phase space characterization (on-going N. Bidault) ➢ Commissioning of the XT00.1300 Silicon detector ➢ Conclude set-up for A/q=4.0 at 7.44 MeV/u to the end of XT01 and XT02 ➢ Commissioning of changes in low and high level BI software



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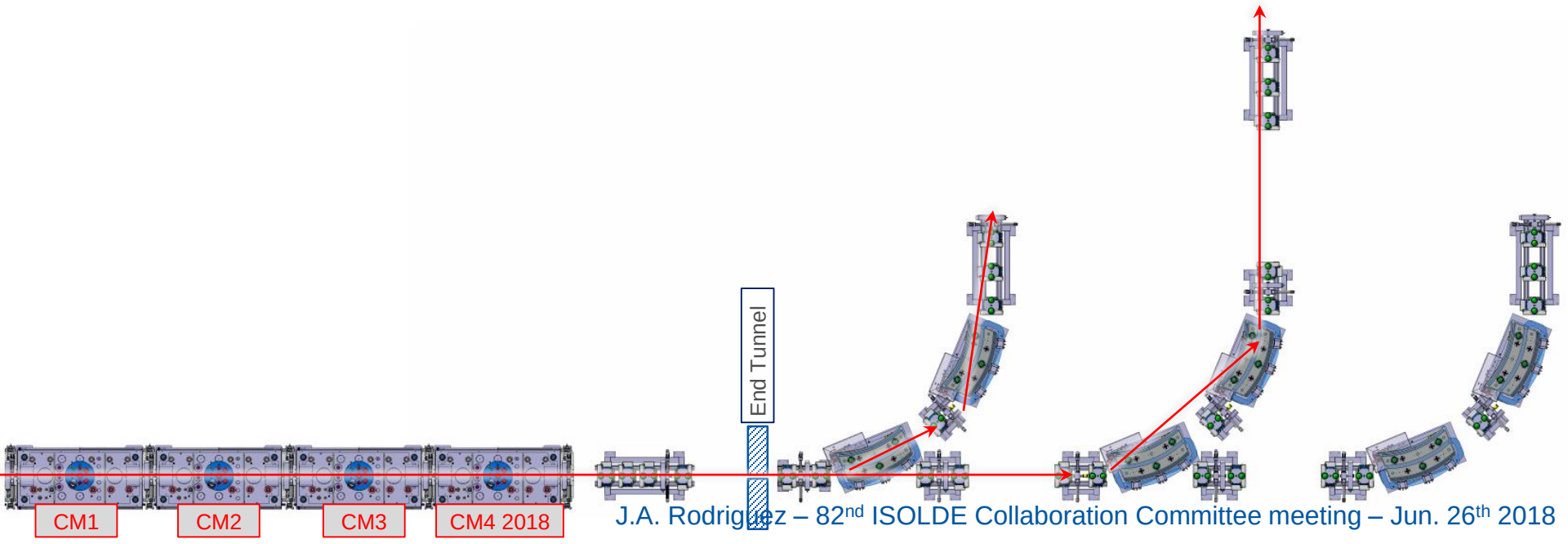
27	➢ Set-up for ^{40}Ar^{9+} (A/q=4.44) at 7.44 MeV/u to the end of XT01 and XT02 ➢ Longitudinal phase space characterization ➢ Beam-based calibration of the rest of the SRF cavities



Beam Commissioning (pending):

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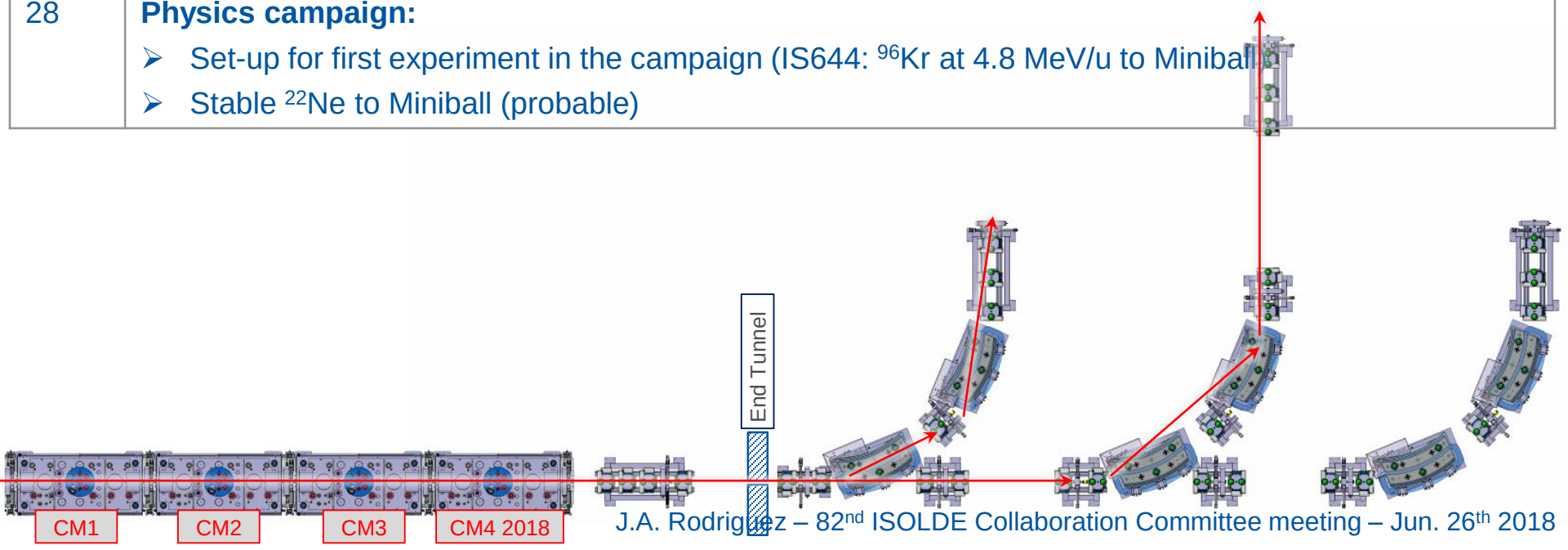
28	**Physics campaign:** ➢ Set-up for first experiment in the campaign (IS644: ^{96}Kr at 4.8 MeV/u to Miniball) ➢ Stable ^{22}Ne to Miniball (probable)



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Summary:

Commissioning of the REX-TRAP, REX-EBIS and REX Linac:

- All systems recommissioned by week 20 (similar to 2017)
- Proof of concept for a new method to characterize very weak stable contaminants from the REX-EBIS (N. Bidault, IPAC'18 conference proceedings)

Machine Check-out and Beam Commissioning of HIE-ISOLDE (completed):

- Field regulation and automatic degaussing of the HEBT dipoles
- Set-ups for $^{12}C^{4+}$ and $^{22}Ne^{7+}$ using all the SRF cavities to end of XT01 and XT02
- Beam to Miniball (65 hours of $^{22}Ne^{7+}$ at 6.16 MeV/u)
- Beam to ISS (99 hours of $^{22}Ne^{7+}$ at 9.48 MeV/u)
- Initial set-up for A/q=4.0 using all the SRF cavities to XT01.0400

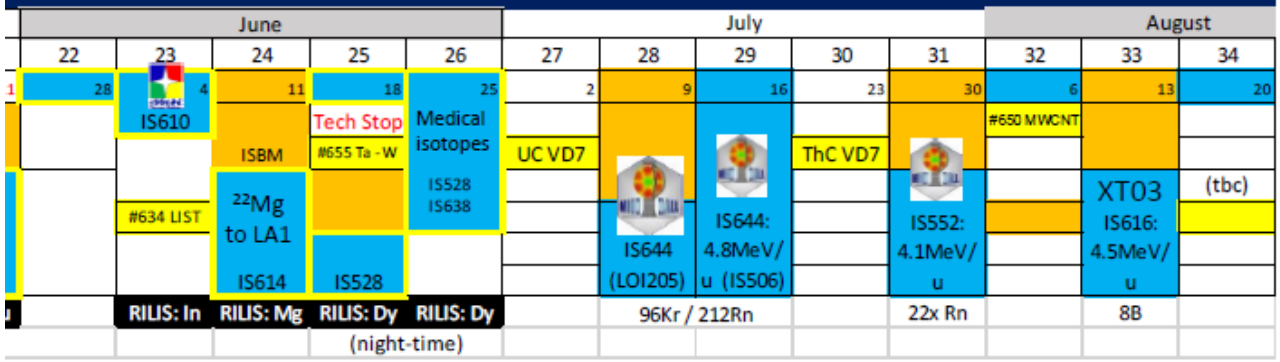
Beam Commissioning of HIE-ISOLDE (pending):

- Set-up for $^{40}Ar^{9+}$ (A/q=4.44) at 7.44 MeV/u to the end of XT01 and XT02
- Transverse and longitudinal phase space characterization
- Beam-based calibration of the SRF cavities

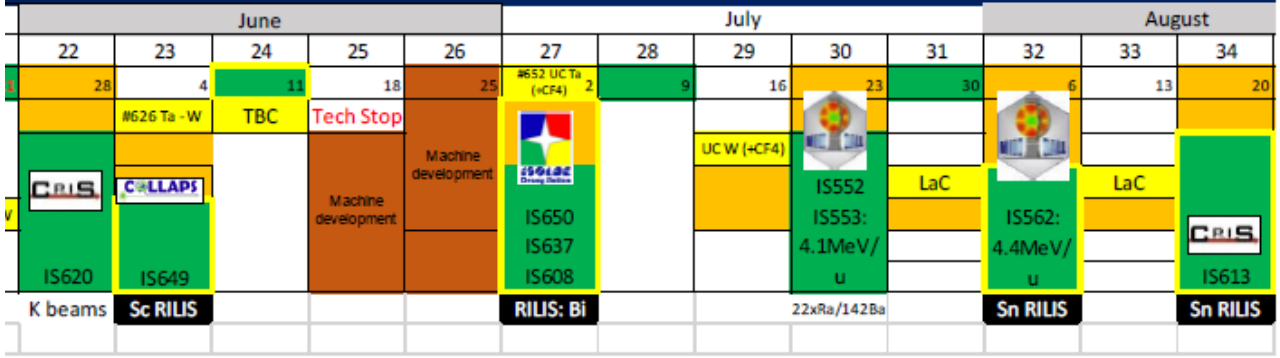
Back-up slides:

First part of the High Energy Physics Campaign:

GPS schedule 2018



HRS schedule 2018



Target change	CERN holiday	Setting up/proton scan/yield	Physics GPS	Physics HRS	RILIS run

KJ: 24.05.