2nd Follow-up of the ABP injector day

Alessandra Lombardi for HSL

LINAC4 – 6 actions

LINAC3 – 3 actions

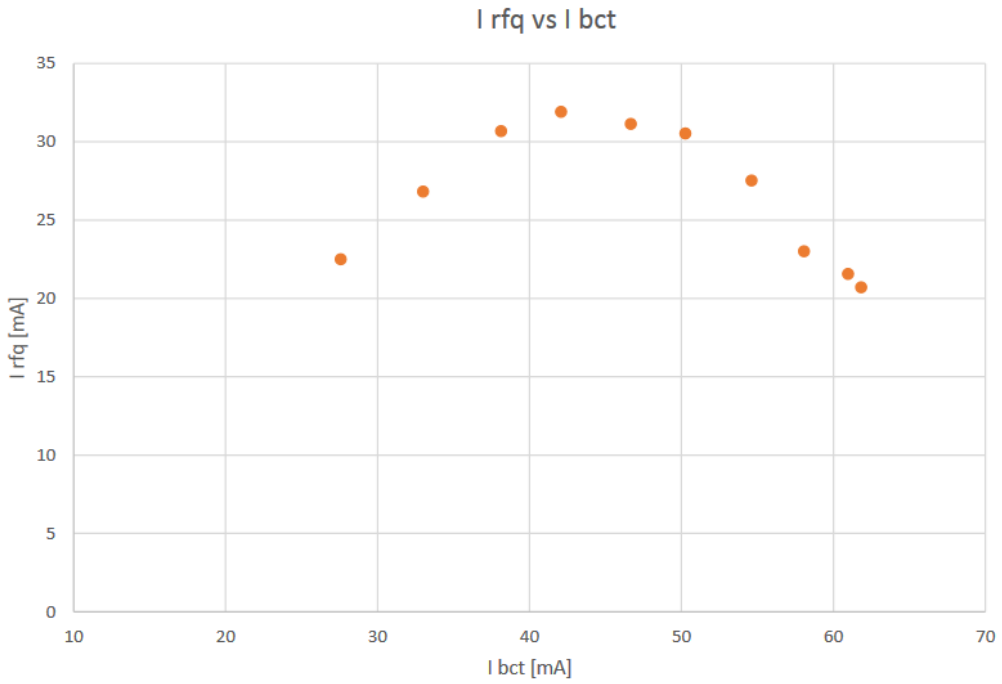
Action inventory

Action	Status	Follow up
LINAC4-1 Reliability	Closed 4th july	Reliability will be tracked C. Rodrik confirmed that AFT is funcional
LINAC4-2 painting period	Closed 4th july	Yannis/Fanouria/Hannes have clarified the need for paiting. Not critical anymore. RF is ready with the debuncher paiting function
LINAC4-3 source for the LBE run	Closed	See later
LINAC4-4 2MHz ripple	Measurements done/ rest ongoing	See later
LINAC4-5 RFQ sparking	Closed 4th July	
LINAC4-6 RFQ integrity	Closed 4Th July	Do we want to re-open?
LINAC3-1 Tetrahedral lead	Post-poned to dec 2019	
LINAC3 – 2 Moveable puller	Closed 4th July	
LINAC3 – 3 stripping foil monitoring	Closed 4th July	

LINAC4-3 source for the LBE run

JULY 4th

- **ACTION: Alessandra: What is the source configuration for the LBE run (aperture/electrodes/cesiation type). Open questions and path to decide them. BY END JUNE.**



Cusp free source 7.5 mm bore. Possibly continuous cesiation. Max intensity out of the RFQ so far 32 mA, pulse flatness achieved. Stability achieved.

Further improvements /decision points

1) Continous cesiation / final decision end of august:
   - -analysis of data by Edgar M still to be done –end July
   - -approval BY MPP still to be obtained – end July
   - -install system to perform continuous/discrete cesiation 22-26July
   - -integration in Autopilot foreseen
2) Autopilot:
   - -test on the LINAC4 after the RFQ–end July

LINAC4-3 source for the LBE run

- **Cusp free source 7.5 mm bore confirmed**
  - **Continous cesiation mode was approved by the MPP with some non-binding recommendation**
  - **System to perform continuous/discrete cesiation was installed on time, tested sufficiently. Extra safety motorized cesium valve was installed just before tunnel closing.**
- Source at the test stand , with reduced extraction bore (aim to increase the focusing) has given promising results. Once everything is understood we may consider it a candidate for the LINAC4 tunnell.

LINAC4-4 2MHz ripple

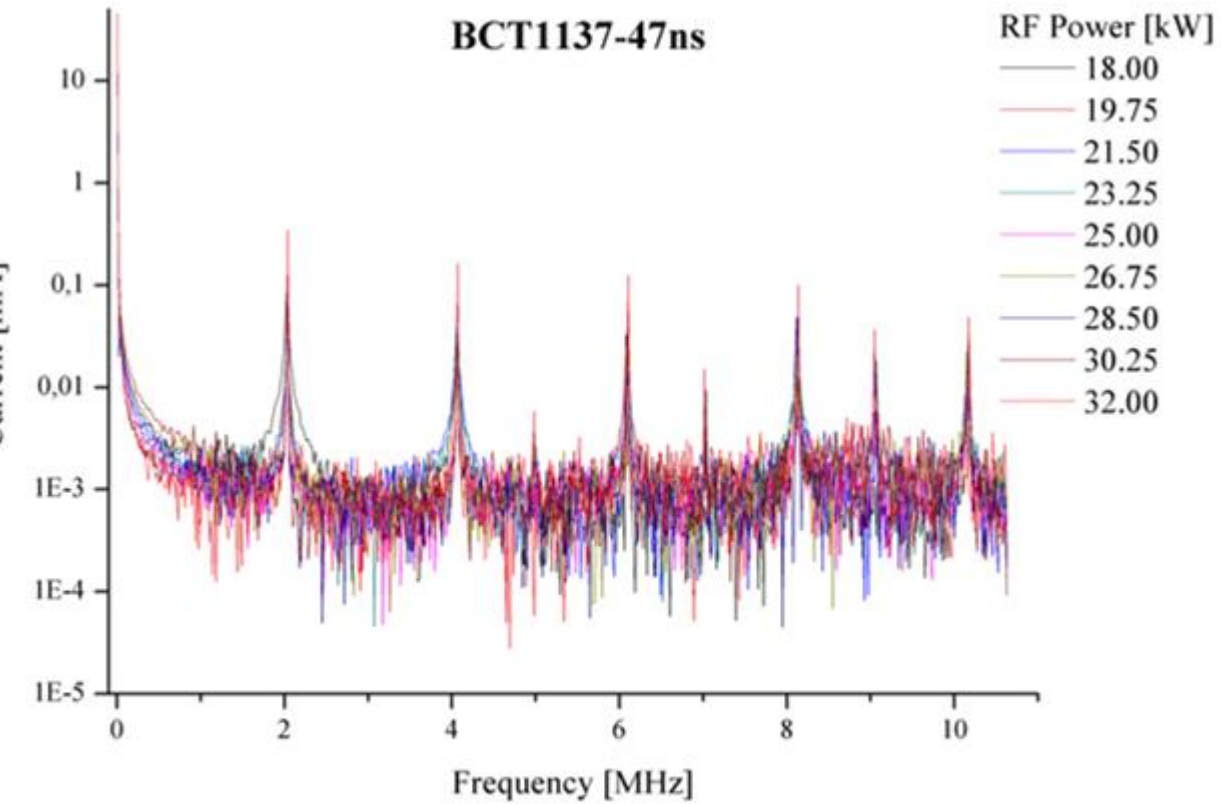
JULY 4th

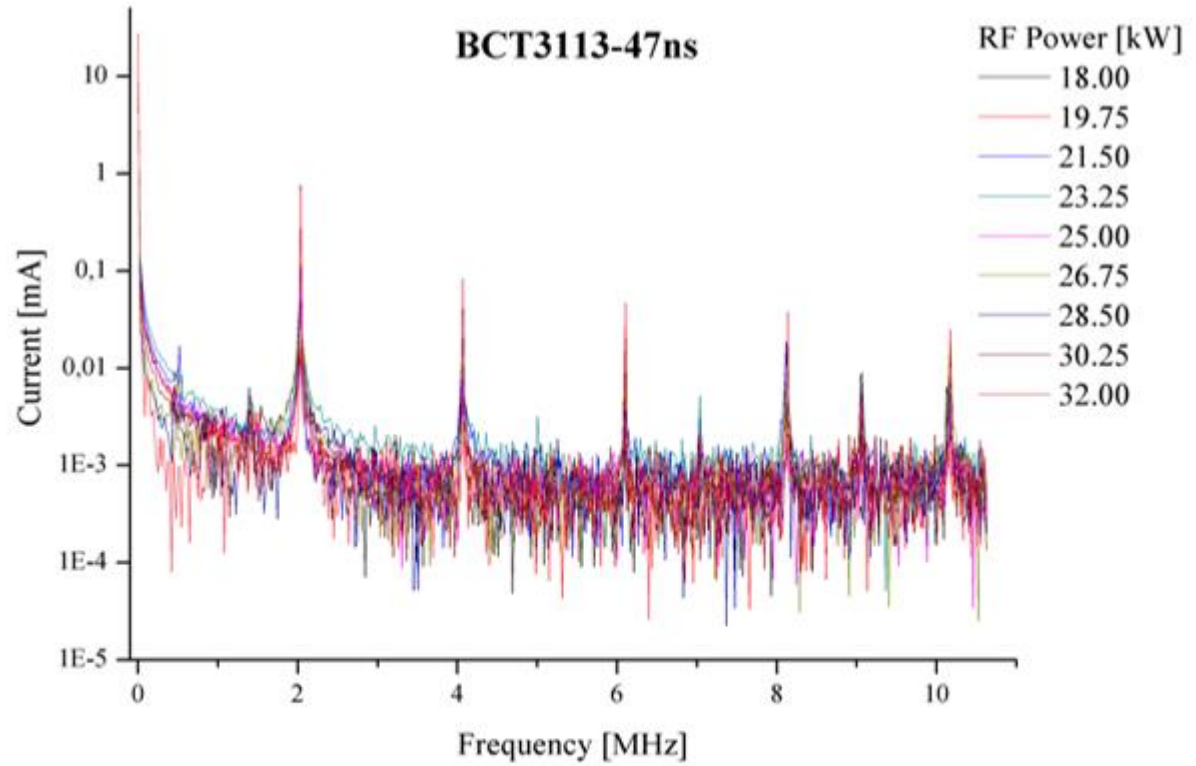
- **ACTION: Alessandra, Yannis. 2MHz Ripple on beam: Quantify the amplitude, frequency of these intensity oscillations at the output of the RFQ from existing measurements. Determine impact in the PSB performance.**

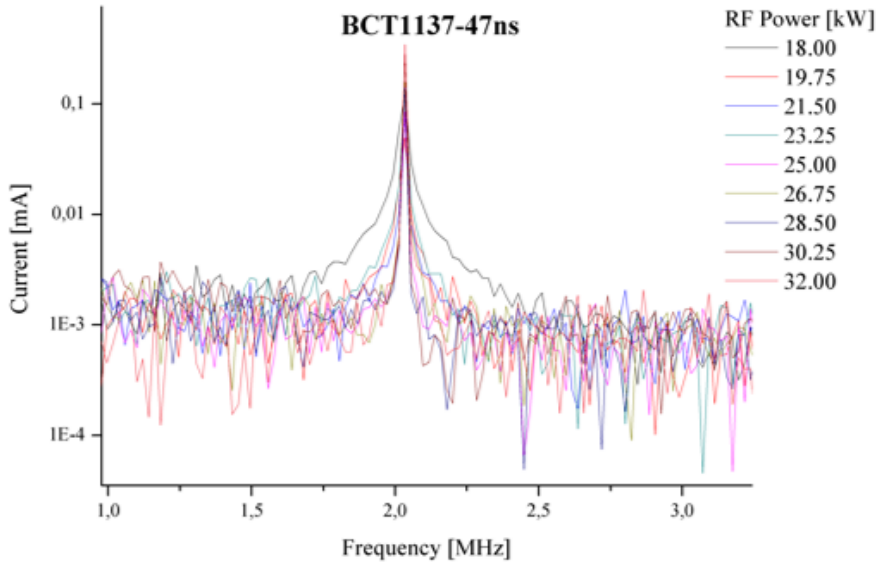
- **There was a massive amount of work on the 2MHz amplifier done in February march. We don't have data after that date (we have them but lacking resolution). Take data again in august after the RFQ and access.**

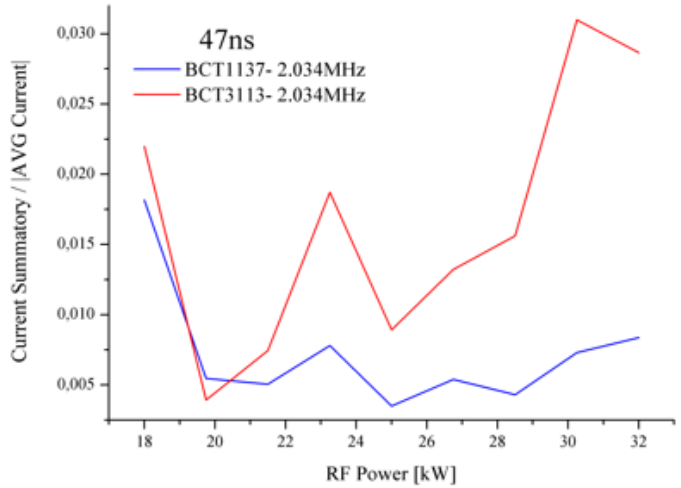
2 MHz noise evaluation

- The plasma in the ion source is driven by a 2 MHz RF through an antenna.
- Record BCT.1137 and BCT.3113 for different source RF power levels (200 µs after SEJ, 47.05 ns and 94.1 ns sampling times)



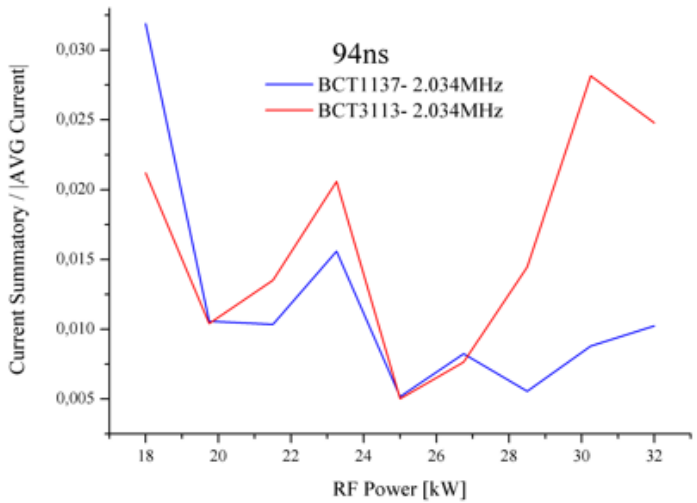






Results:

- ≈ 0.5% beam ripple 2 MHz after the source
- < 3 % beam ripple 2 MHz after the RFQ
- Higher frequency ripple in the per-mille level
- RFQ does not seem to damp oscillations
- Statistics may be too low to draw conclusions on the dependence on power



LINAC4-4 2MHz ripple What next

- Wait for measurements at 160MeV and see what this does in the PSB? or use the data we have ?

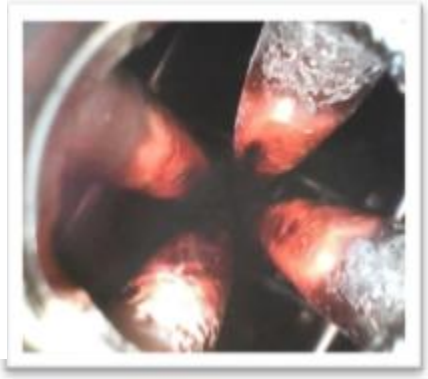
- RF colleagues : try to limit this component

LINAC4-6 RFQ integrity

- Do we want to re-open ?
  - EM in communication with R. Welton at SNS
  - Insist on inspection of the vanes after the LBE run

SNS is at65keV, we are at 45keV
and that they run at 60 Hz so
17 SNS years are 1020 LINAC4 years!
The pulse length is comparable 1 ms
for SNS and we are at 850-
900microsec

- The Berkeley RFQ (~17 years of service) has undergone a slow degradation of transmission which was making it increasingly difficult to meet SNS beam current requirements.
- Several unexplained detuning events and shifts in the RFQ field distribution have motivated us to procure a spare RFQ accelerator and build a dedicated off line facility to test it.
- Seized the opportunity to make multiple upgrades the ion source systems and tested them on the BTF and ISTS



Robert Welton for the SNS ion source team ICIS 2019 Lanzhou