



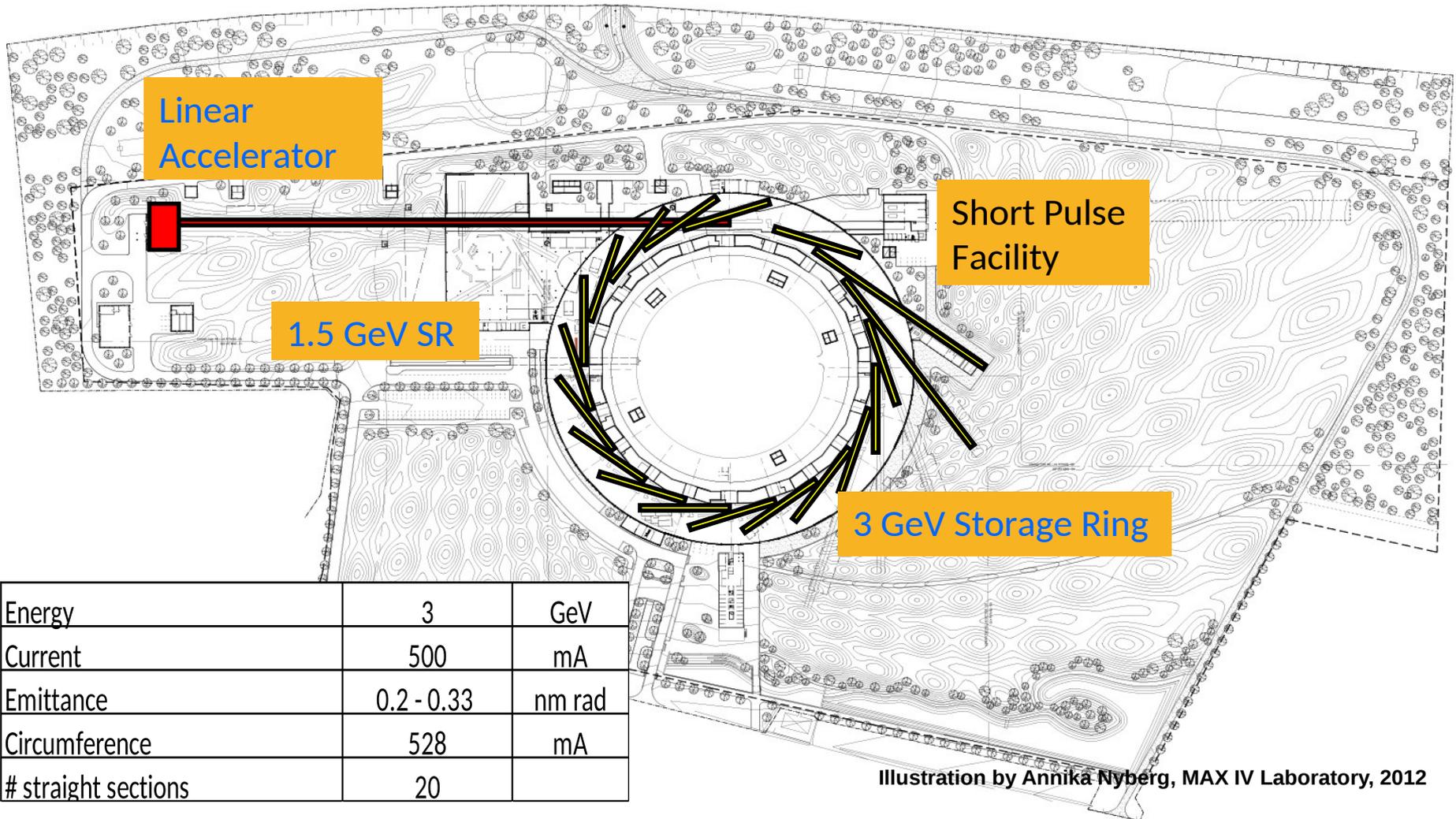
Status of the MAX IV accelerators

M. Sjöström on behalf of the MAX IV team
MAX IV Laboratory

Outline

- Facility overview
- Linear accelerator
 - Activities
 - Commissioning status
- 3.0 GeV storage ring
 - Subsystem status
 - Installation
 - Next steps

Facility overview



Energy	3	GeV
Current	500	mA
Emittance	0.2 - 0.33	nm rad
Circumference	528	m
# straight sections	20	

Illustration by Annika Nyberg, MAX IV Laboratory, 2012

© Photo: Perry Nordeng
18-Sept-2014

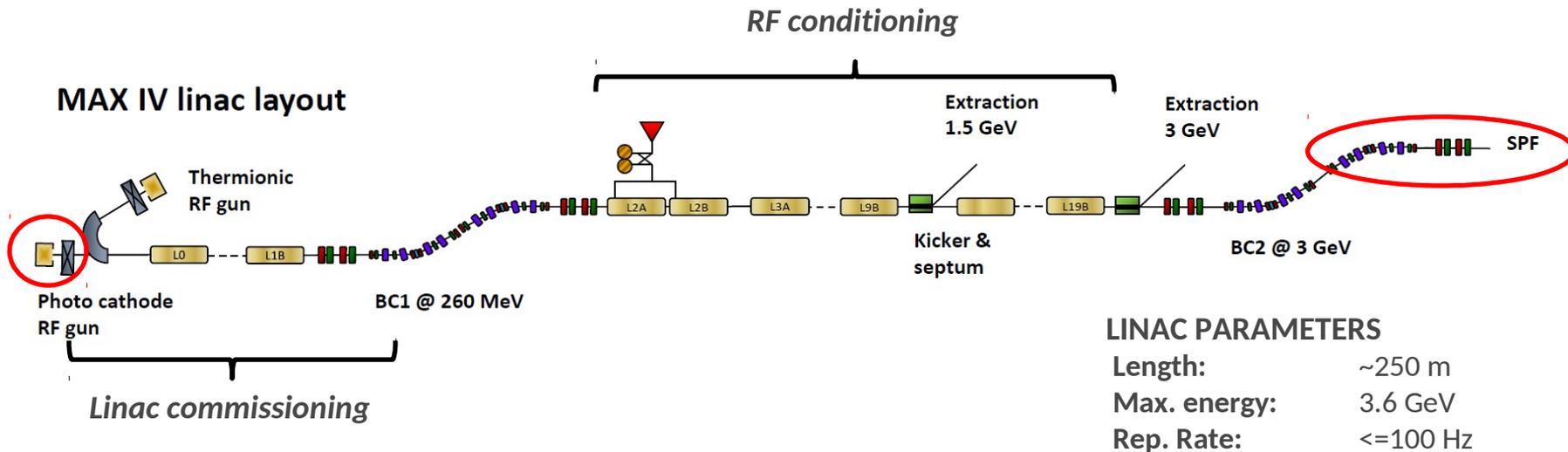




Status and activities

Linear accelerator

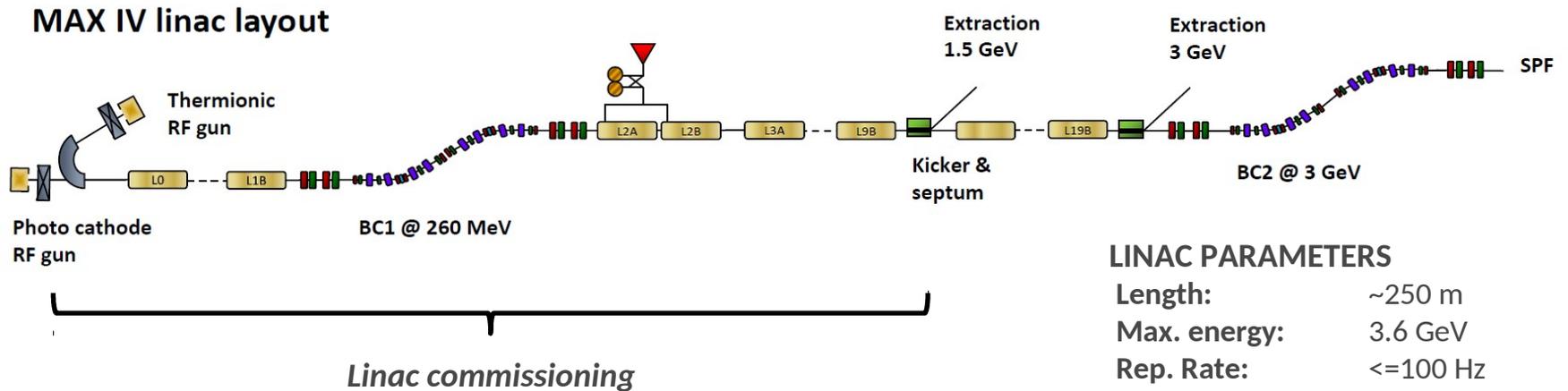
Current linac activities



Activities

- Linac commissioning started mid-2014,
 - running with a thermionic RF gun
 - Hybrid mode with commissioning in gun – BC1 area, conditioning post-BC1
- RF conditioning
 - Waveguide sparking issues (baking, conditioning 24/7)
- Photo-cathode gun installation and commissioning
- FemtoMAX beamline installation and subsystem tests

Commissioning status



Status

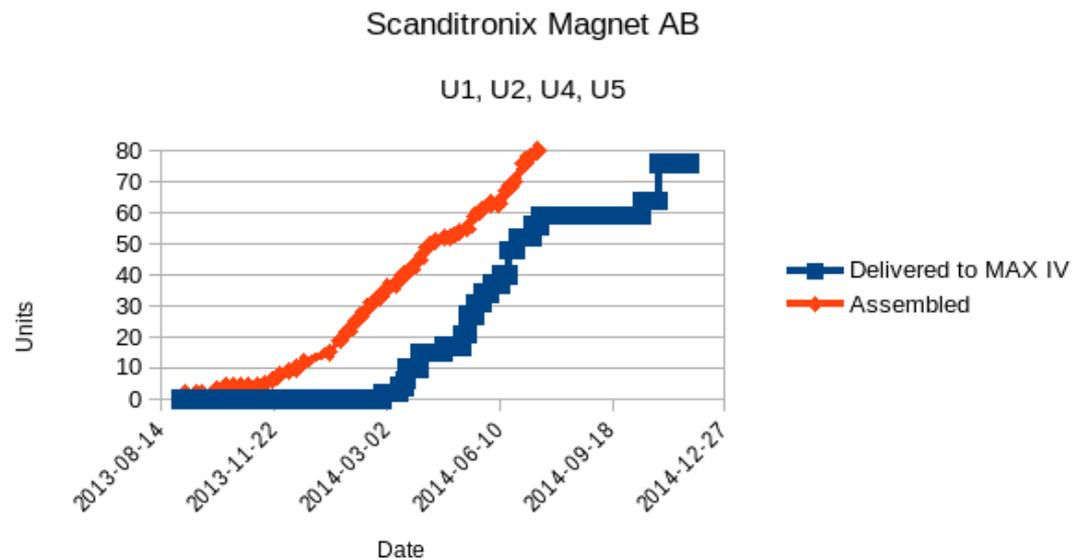
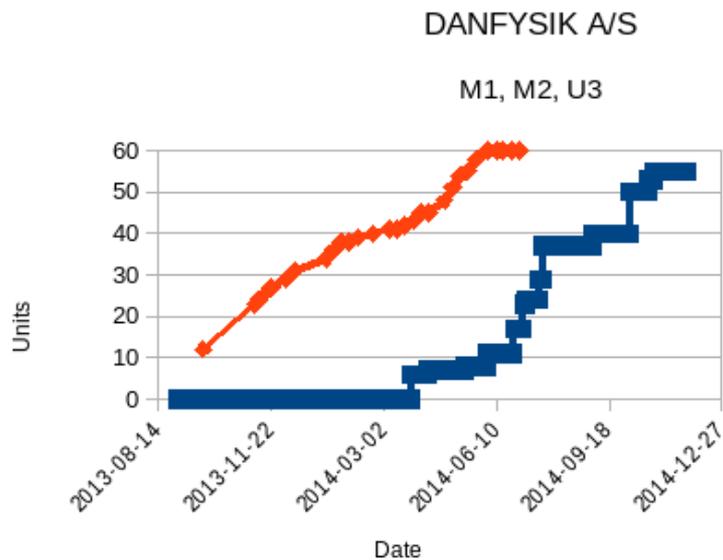
- Until 2014-11-19 linac commissioning was restricted to the gun – BC1 region.
- 2014-11-20 permission granted to proceed, 1.5 GeV extraction area reached by evening. Next up is an energy measurement in the 1.5 GeV transfer line.
- RF waveguide bake-out completed, conditioning still in progress
- Photo-cathode gun tested, produces electrons via photo-emission. Controls integration in progress.



Status and activities

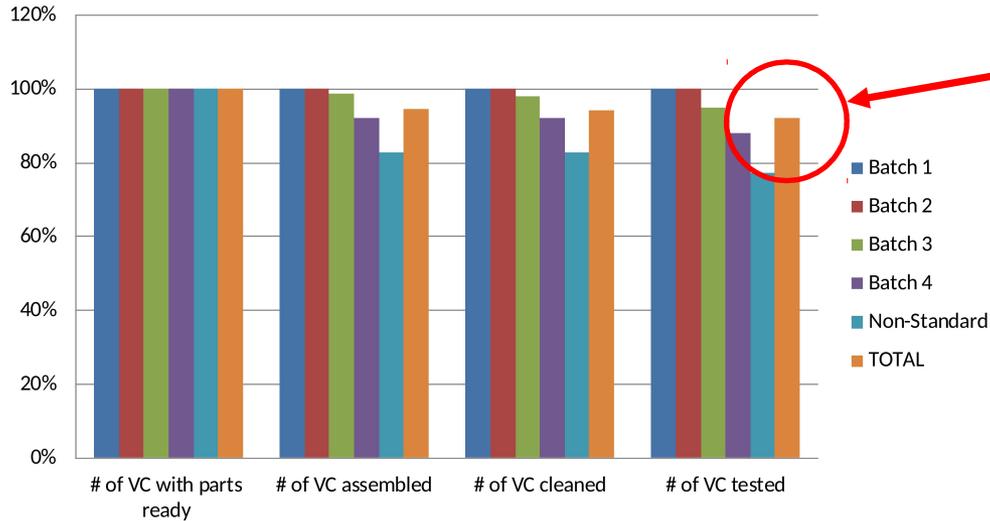
3.0 GeV storage ring

Subsystem status: magnets



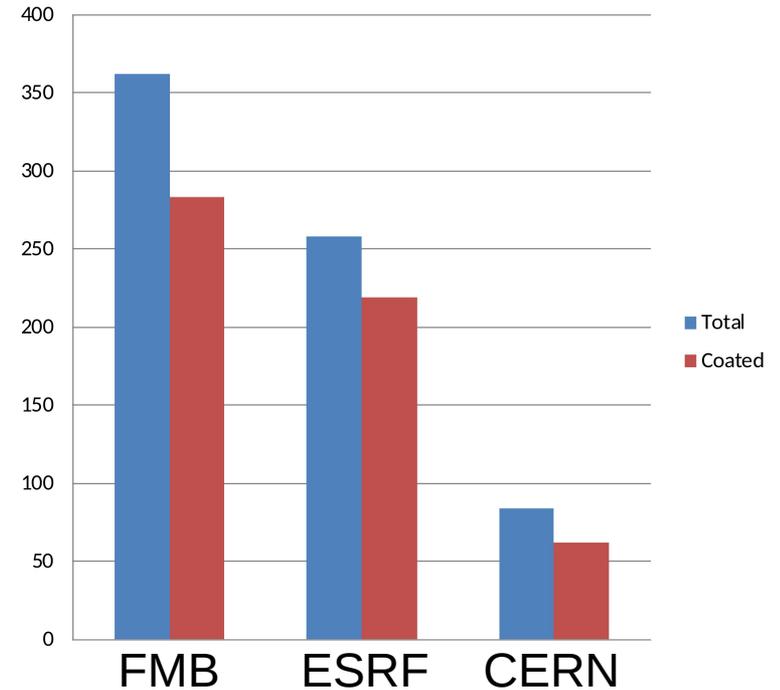
Status as of 2014-11-24:
3 units remaining to be delivered

Subsystem status: vacuum



92% of all chambers tested and approved

80% of the chambers successfully NEG coated



Subsystem status: RF

- ALL 100 MHz RF Cavities delivered, 4 cavities conditioned at high power
- All 300 MHz Landau cavities and tuning systems delivered.
- All Temperature regulating systems are built and tested.



Subsystem status: RF

- Four contracts placed
 - RF amplifiers
 - Circulators
 - Transmission lines
 - Integration
- Circulators and Transmission lines delivered Oct/Nov 2014.
- 60 kW commercial solid state transmitters under construction
- First pair of SS transmitters planned for Dec. 2014



Subsystem status: power supplies

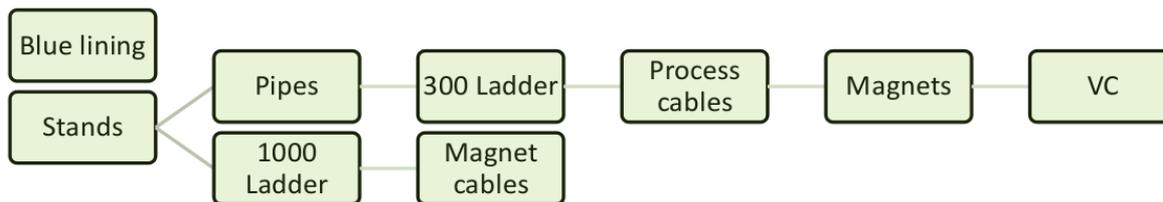
- All Magnet PS for the 3 GeV ring are delivered (no fast correctors)
- All Magnet PS for the 1.5 GeV ring are delivered (no fast correctors)
- PS installation started



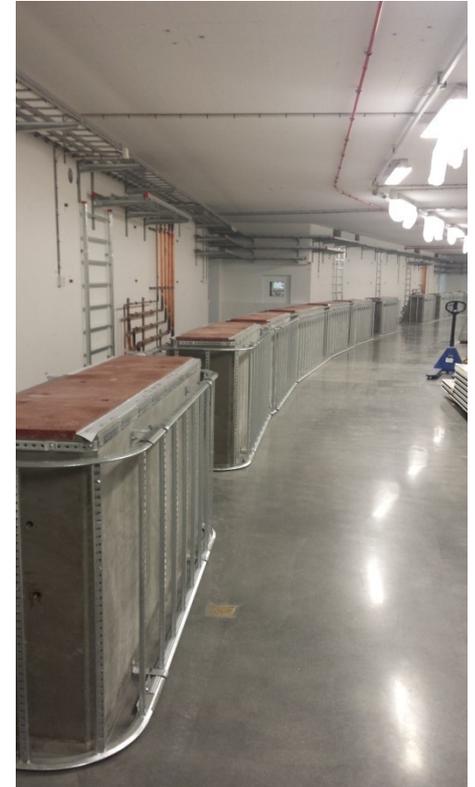
Installation status

Installation sequence

- 2014, April – August:
 - Server and network installations
 - Cabinet assembly and installation
 - Tunnel survey
- 2014, September:
 - Start of tunnel installations
 - Work progressing sequentially achromat by achromat



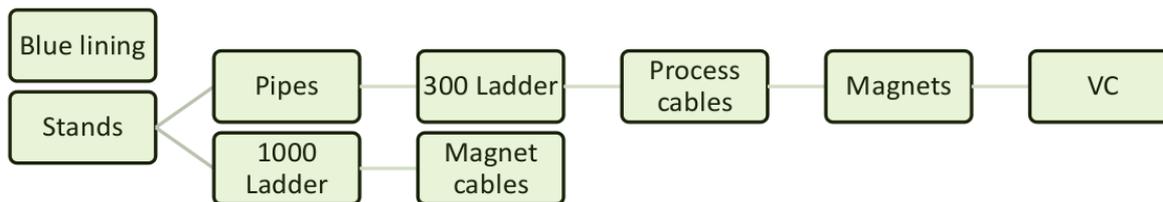
Note! Alignment not showed as a separate box



Installation status

Tunnel installations

- Concrete stand fixation. **COMPLETED**
- Piping back-bone, 4 teams. **COMPLETED**
- Cable trays + power cabling, 4 teams. In progress, on schedule.
- PSS cabling, 2 teams. In progress, on schedule.
- Process cabling, 2 teams. In progress, slightly behind (3 days).
- Magnet block installation. In progress, on schedule.
- Vacuum installation. Recently started, 2 teams allocated with MAX IV technicians and personnel from BINP.



Note! Alignment not showed as a separate box

Installation status



Installation status



2014-11-25

ESLS XXII – Status of the MAX IV Accelerators

MAXIV

Installation status



Installation status



2014-11-25

ESLS XXII – Status of the MAX IV Accelerators

MAXIV

Upcoming activities

December

- Installation and SAT of pulsed dipoles
- 1st transmitter installation and circulator SAT

January

- Completion ofachr. 3 and 13 installation.
- Subsystem tests (SST) power supplies, vacuum system and magnets in achr. 3 + 13. Further SSTs to proceed sequentially around the ring.



The End

Thank you for your attention

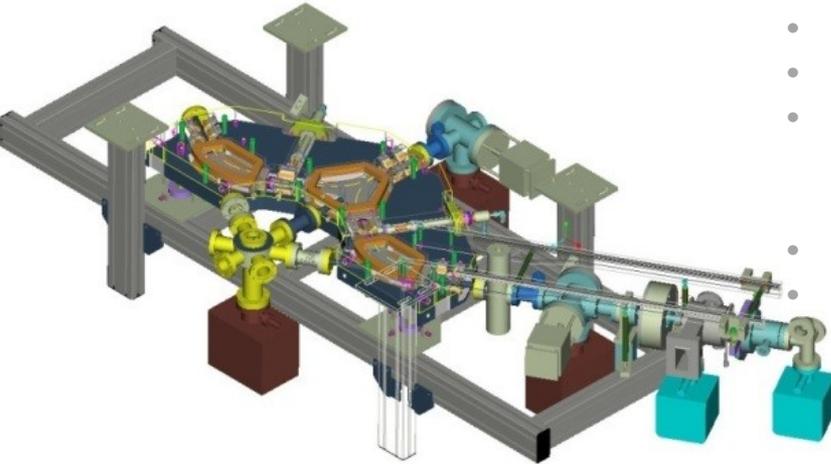
For those that are still awake...

EXTRA SLIDES

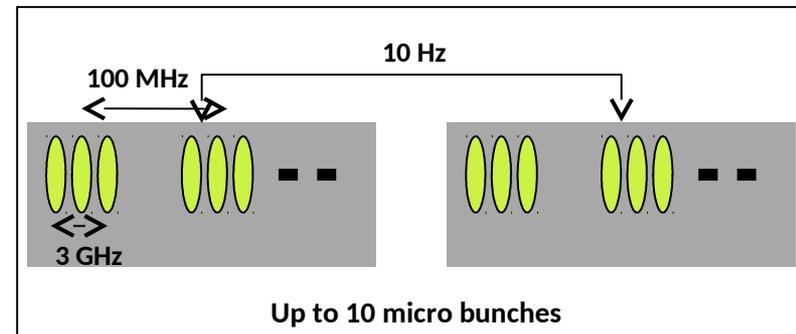
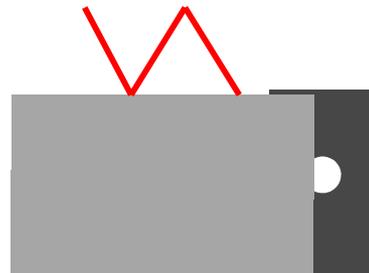
Thermionic gun

- RF gun
- BaO cathode
- Exported to SOLARIS and Canadian light source
- 270 degree energy filter
- In operation at MAX-lab

Design parameters of the MAX IV thermionic pre-injector	
Beam kinetic energy	2-2.5 MeV
Bunch frequency before chopper, fgun	2.9985 GHz
Bunch train frequency, fring	99.931±0.5 MHz
Number of bunches per bunch train	3
Number of bunch trains per LINAC shot	1 or 10
LINAC shot repetition frequency	10 Hz
Total injected charge per top-up injection	9.0 nC

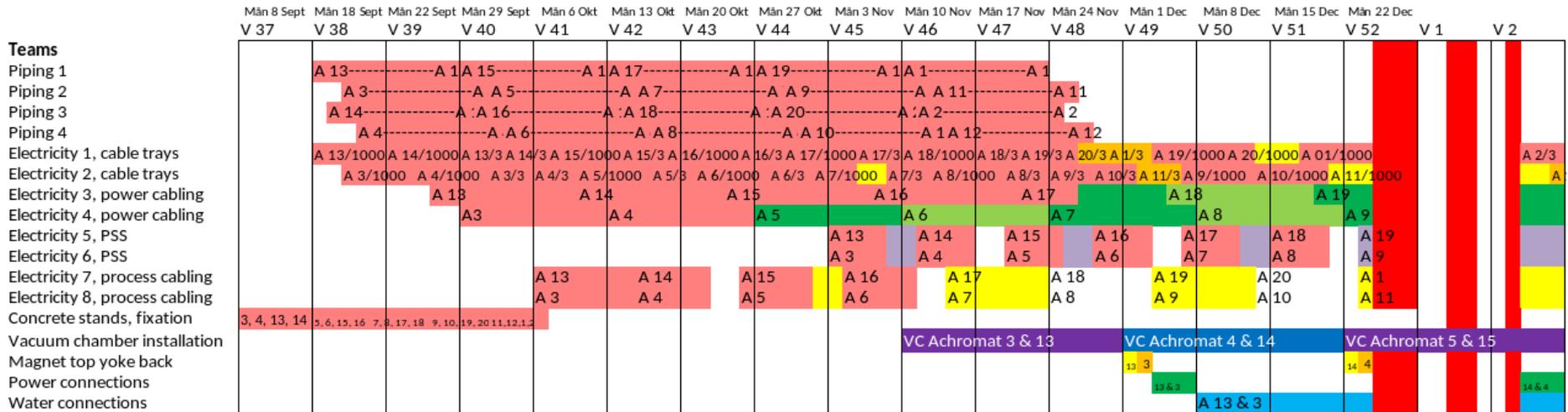


+ Chopper system*

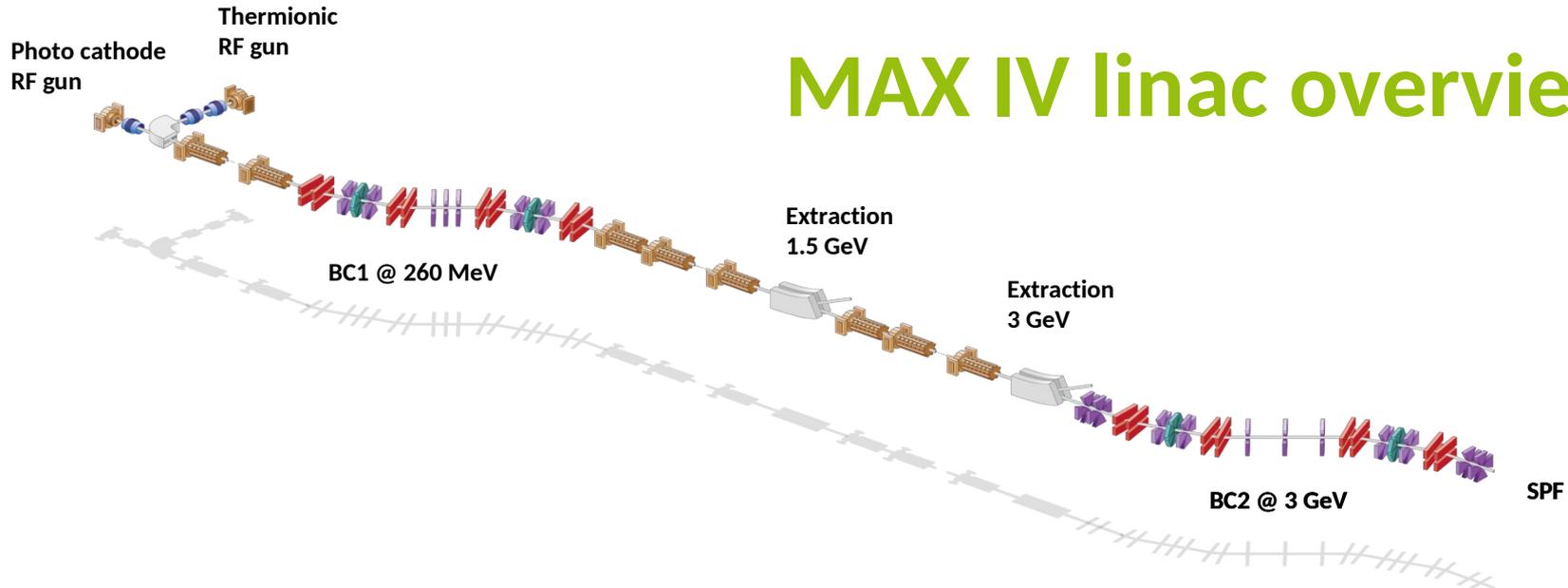


* D. Olsson et al, *A chopper system for the MAX IV thermionic pre-injector*, Nuclear Instruments and Methods in Physics Research, Volume 759, 21 September 2014, Pages 29-35

Detailed installation status



MAX IV linac overview



Full energy injection and top up operation for the two storage rings

Energy	1.5 GeV / 3GeV
Injection frequency	10 Hz
Charge	0.6-1 nC/shot
Emittance	10 mm mrad
Energy spread	<0.2%

High brightness driver for the Short Pulse Facility

Energy	3GeV
Injection frequency	100 Hz
Charge	100 pC
Bunch length	100 fs
Emittance	1 mm mrad
Energy spread	<0.4%