



# Improvements on the ALBA synchrotron light source operation reliability

*Ferran Fernandez*

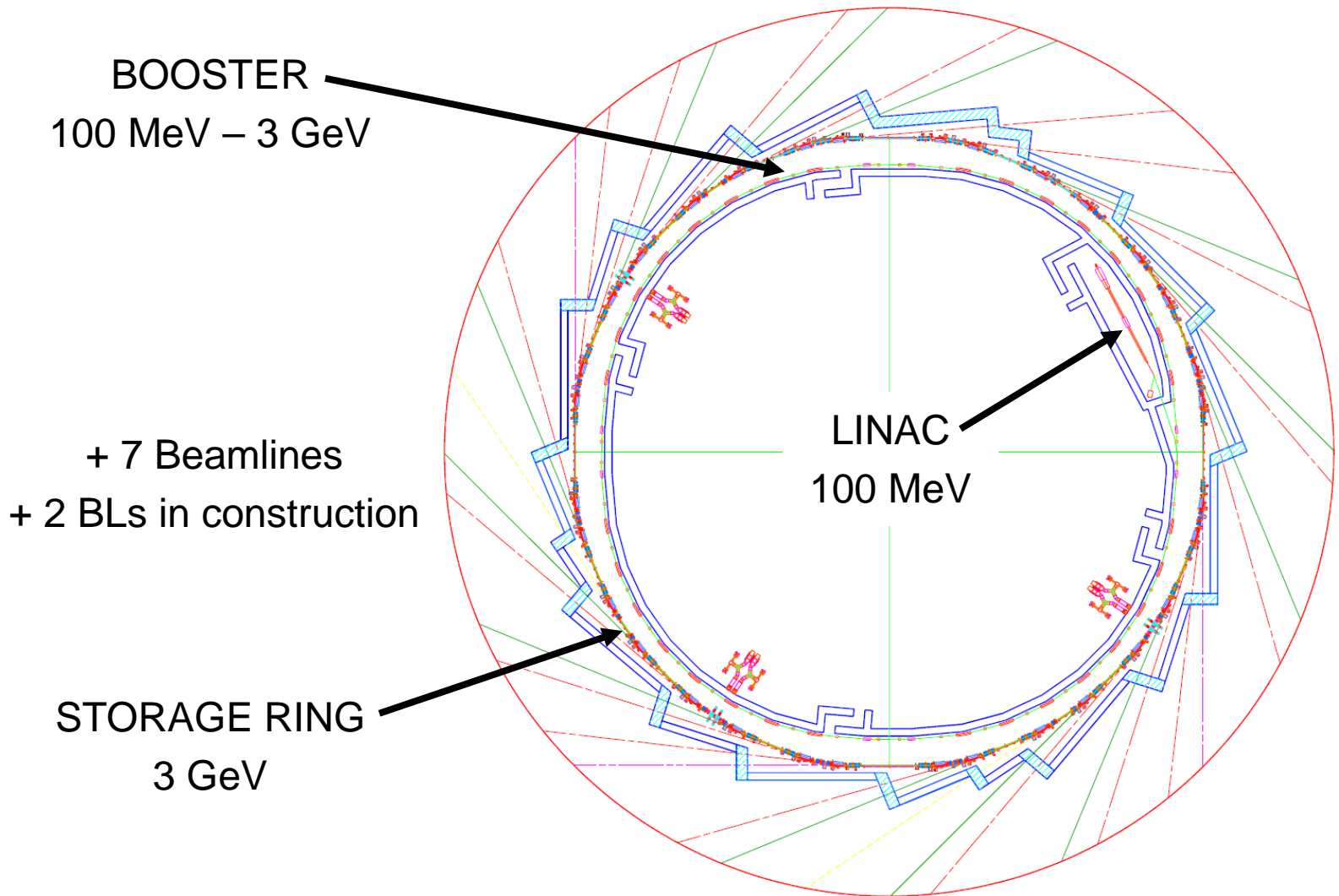
*ARW2015*



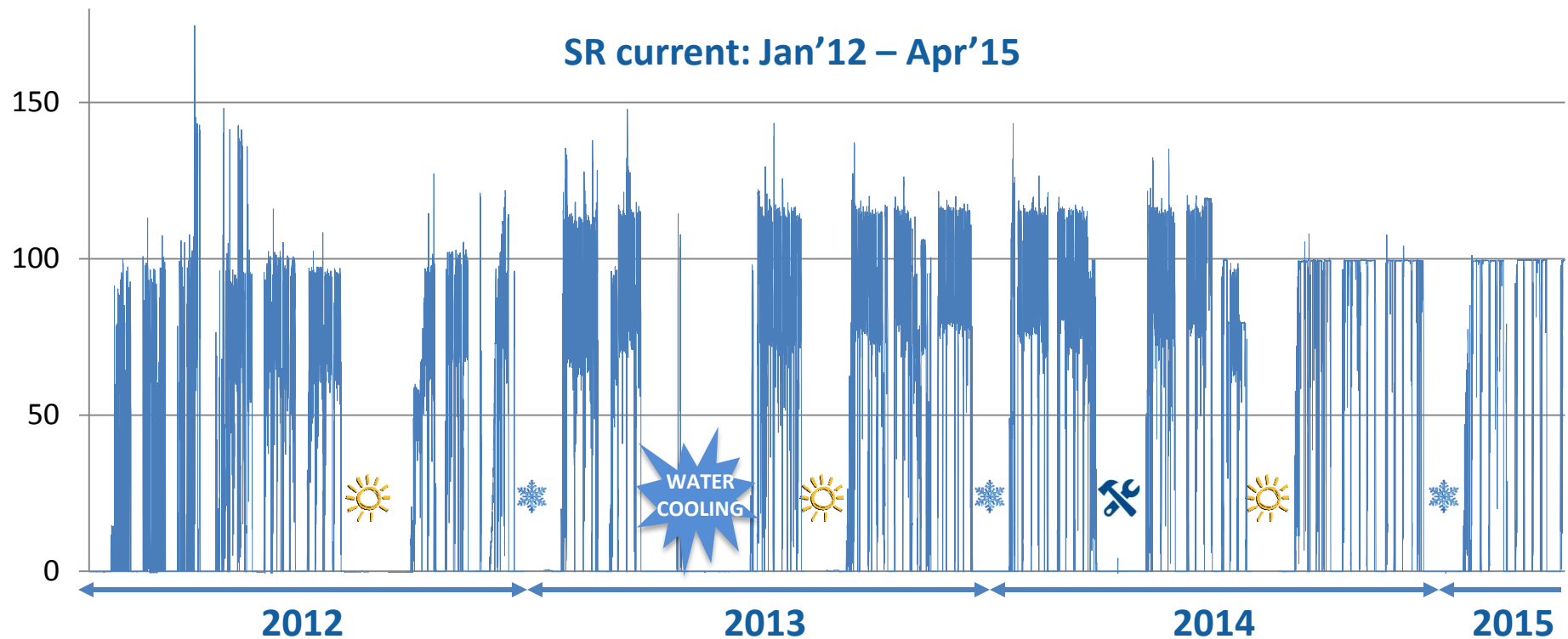


# Outline

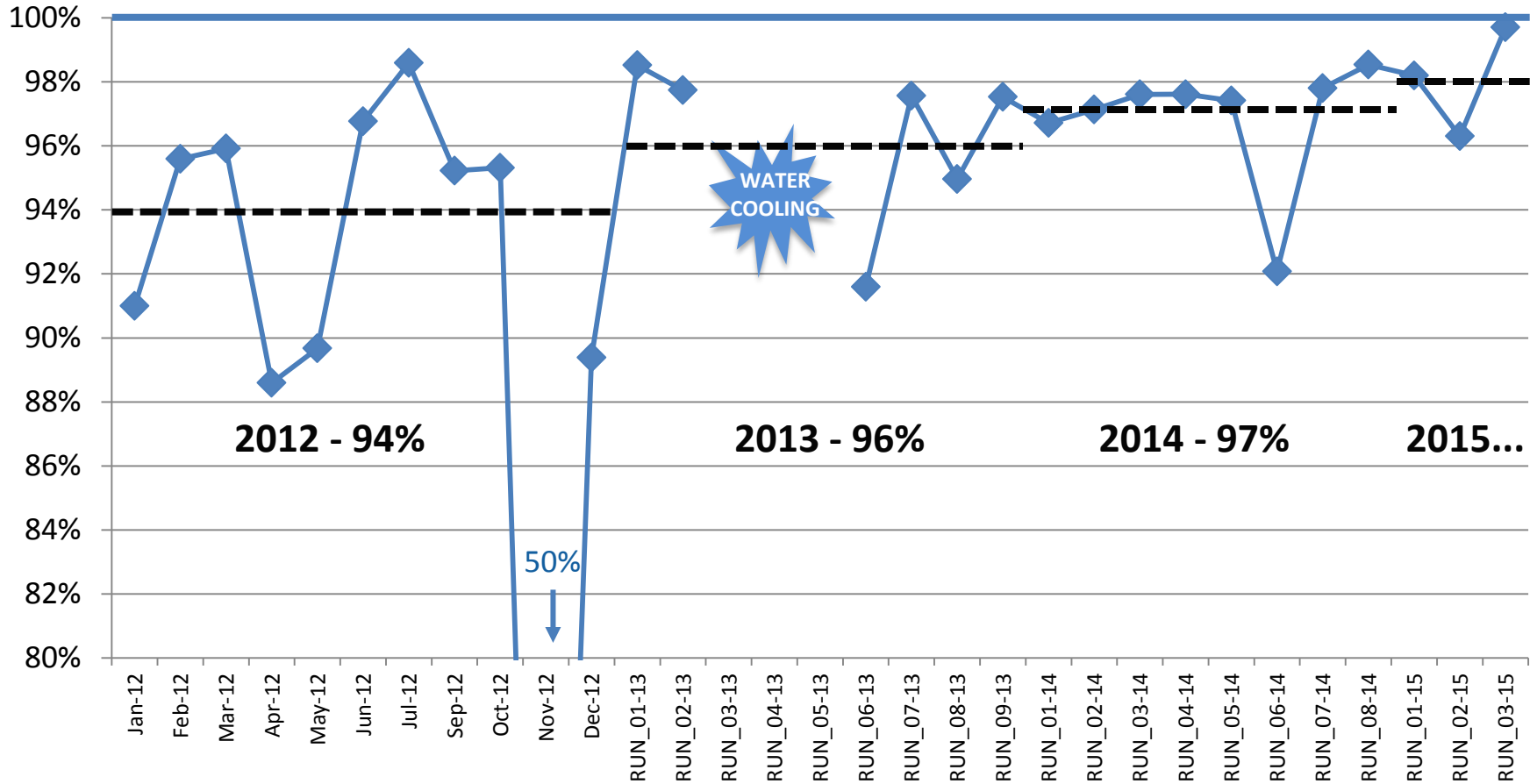
- *Introduction*
  - *The ALBA synchrotron light source*
  - *2012-2015 Operation*
- *Improvements*
  - *Water cooling circuit*
  - *RF operation*
  - *SR injection kicker shielding*



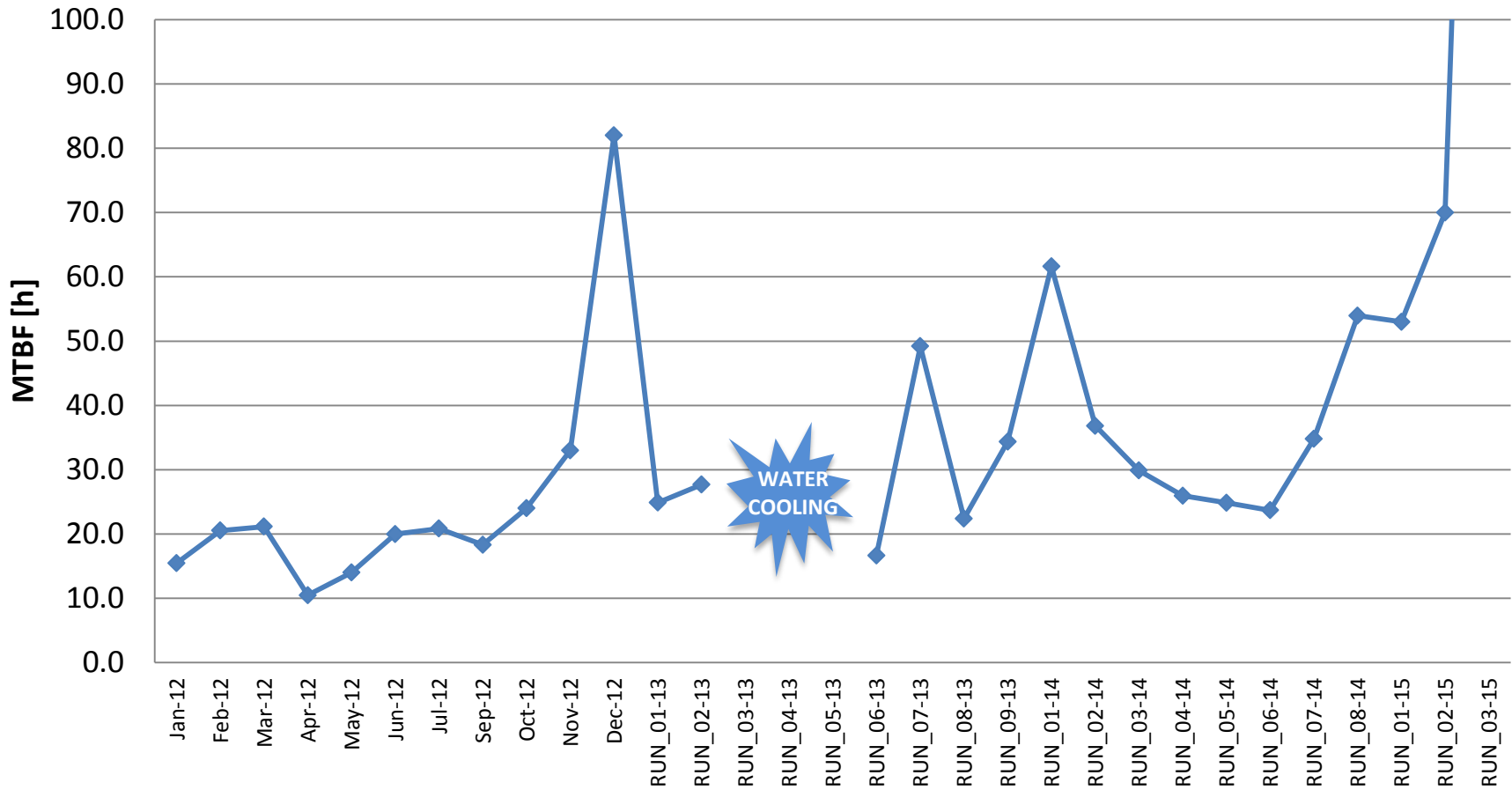
- *Started with users 2012*
- *Started Top-Up summer 2014*



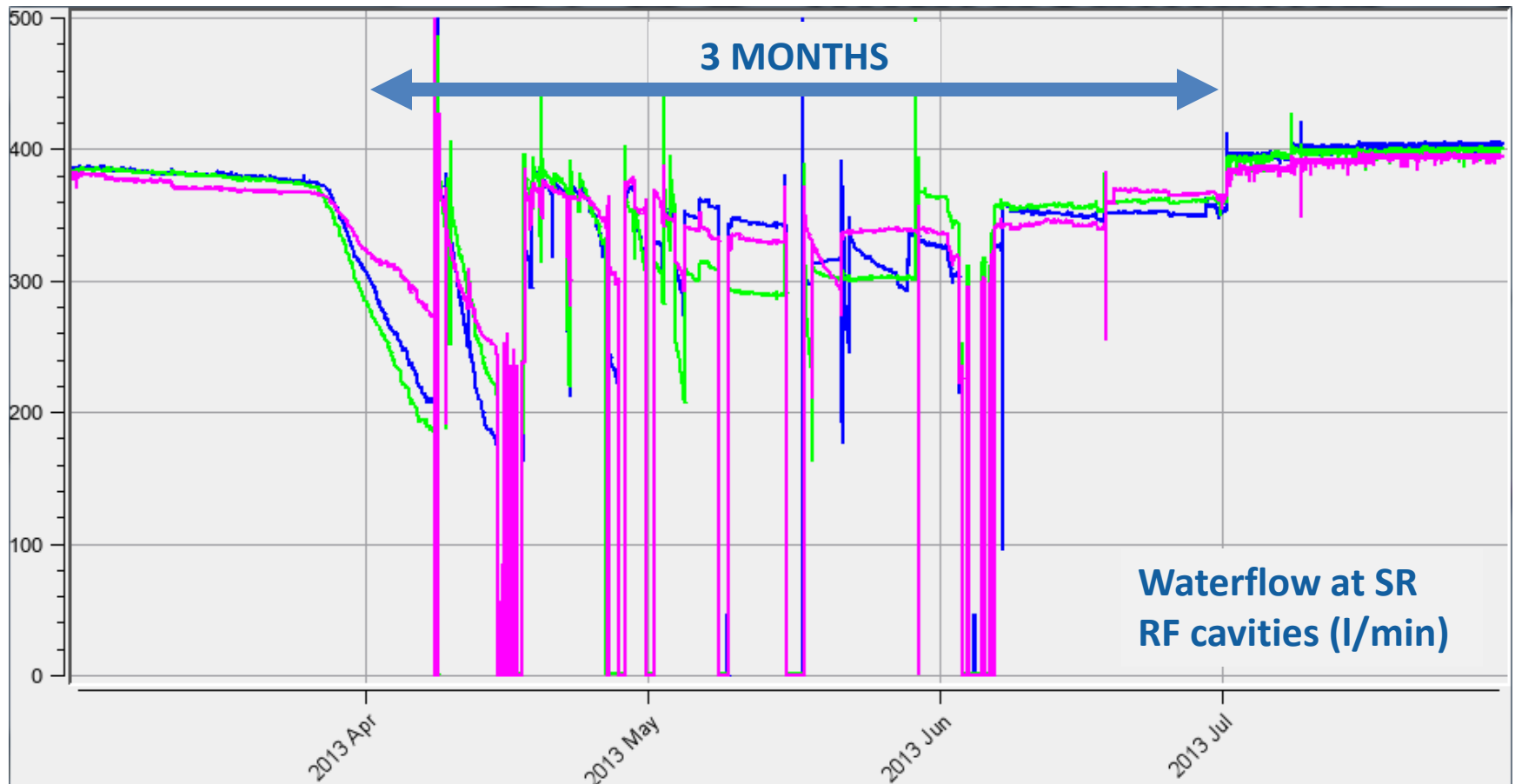
## Availability %



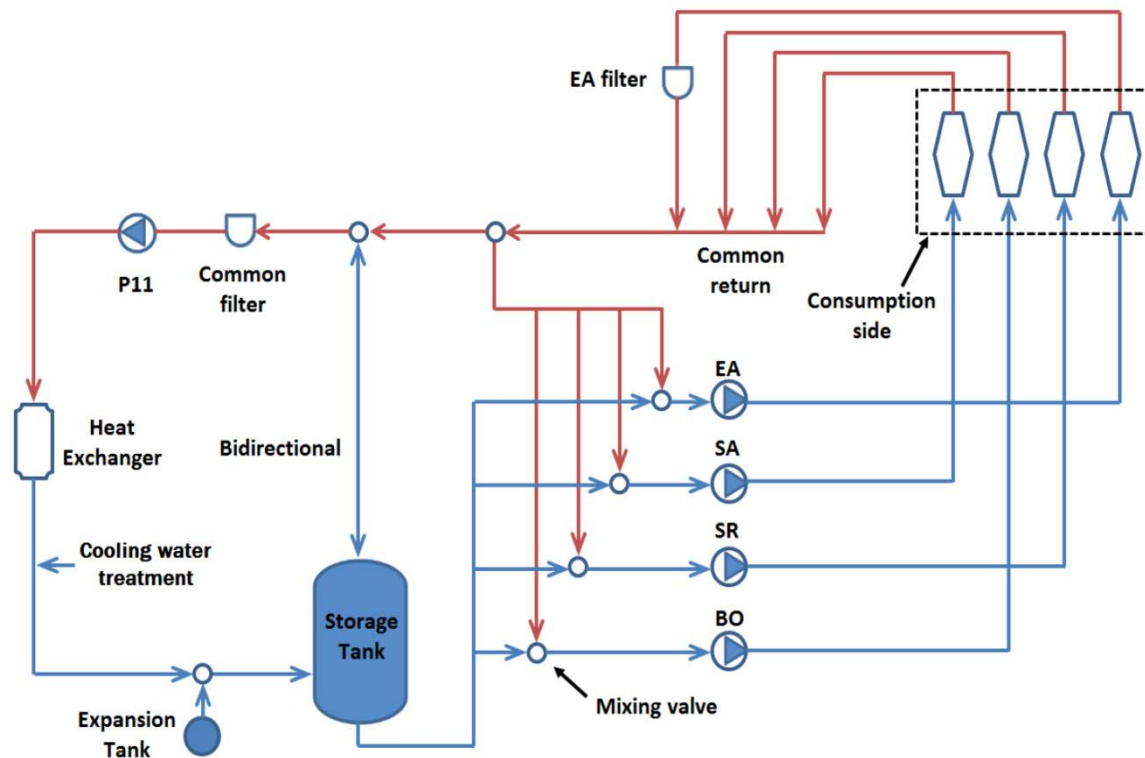
## Mean Time Between Failures



- *Apr – Jun 2013 water flow failure*

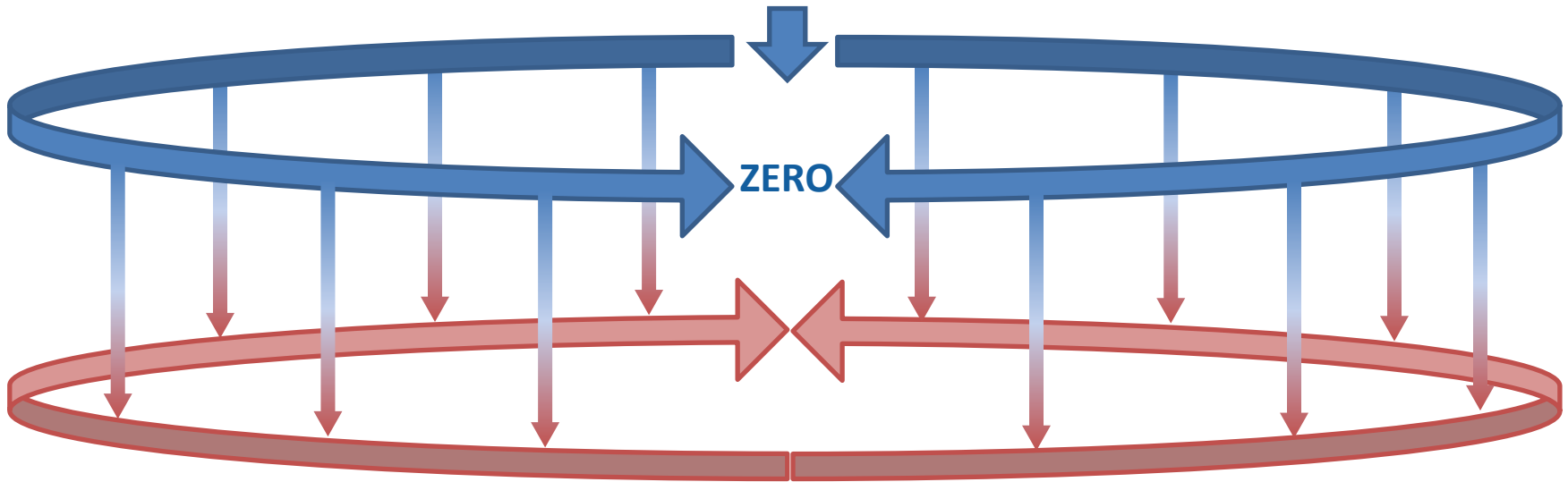


- ALBA facility water cooling system. Four different circuits with a common return: Storage Ring, Booster, Service Area and Experimental Hall.





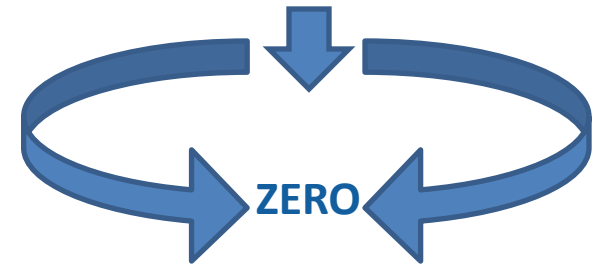
- *ALBA facility water cooling system weaknesses:*
  - *180° circulation with zero velocity point*



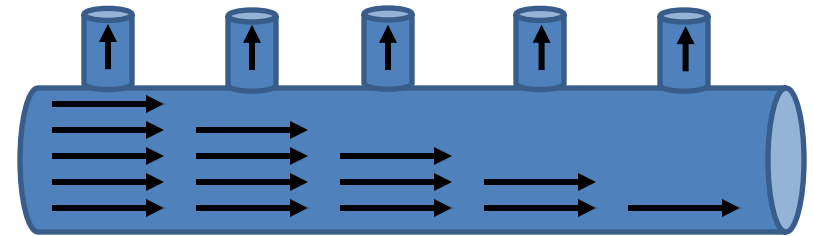
# Improvements – Water cooling

- *ALBA facility water cooling system weaknesses:*

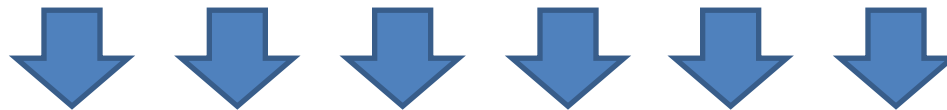
- *180° circulation with zero velocity point*



- *Due to the constant diameter of the pipe along the distribution ring, the velocity decreases*

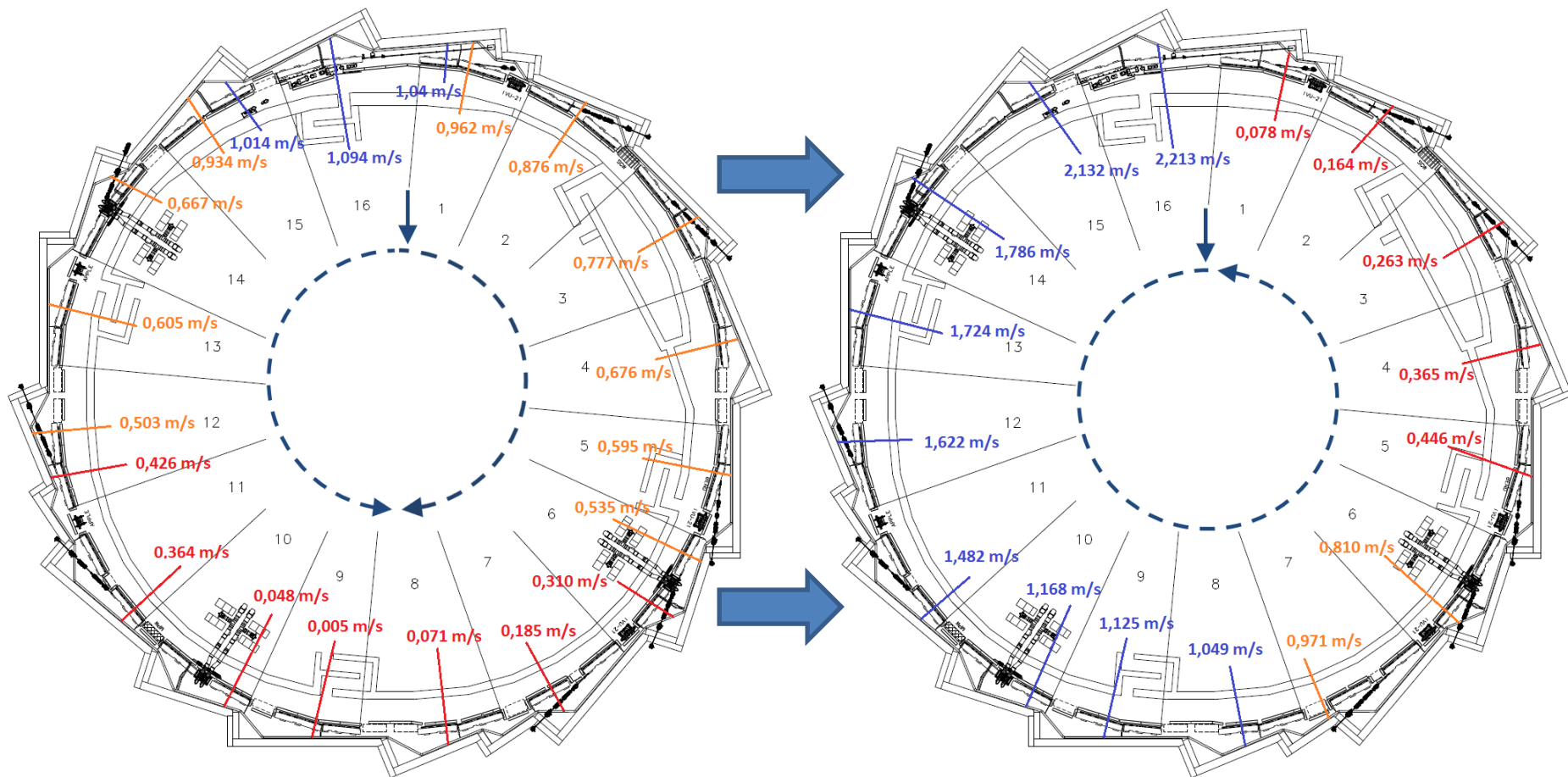


- *The SR and BO WCS distribution pipes are below the equipment.*

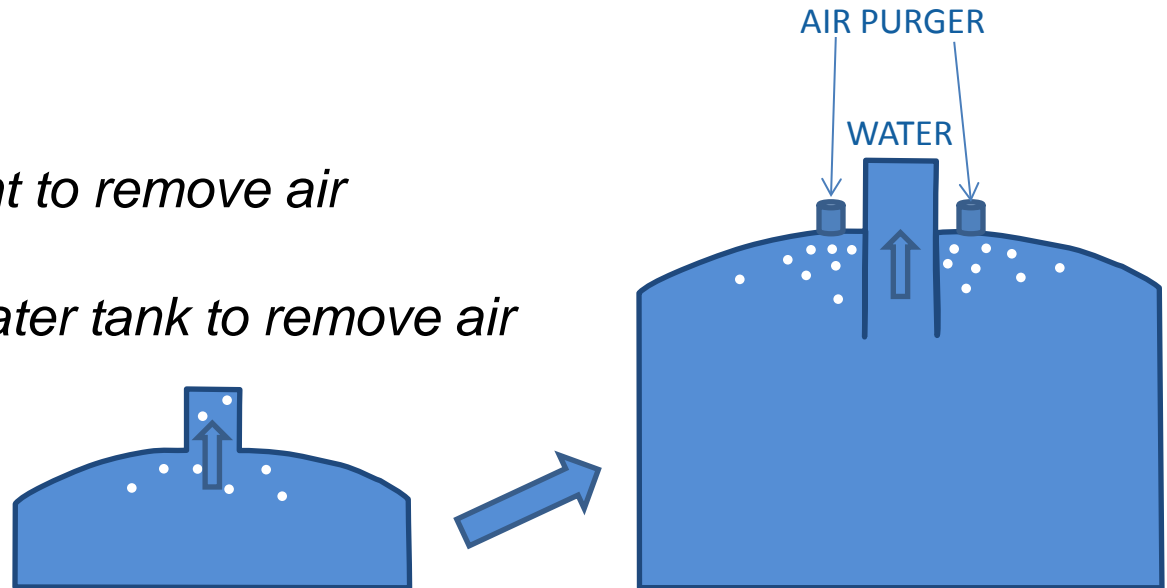


*Air bubbles accumulate*

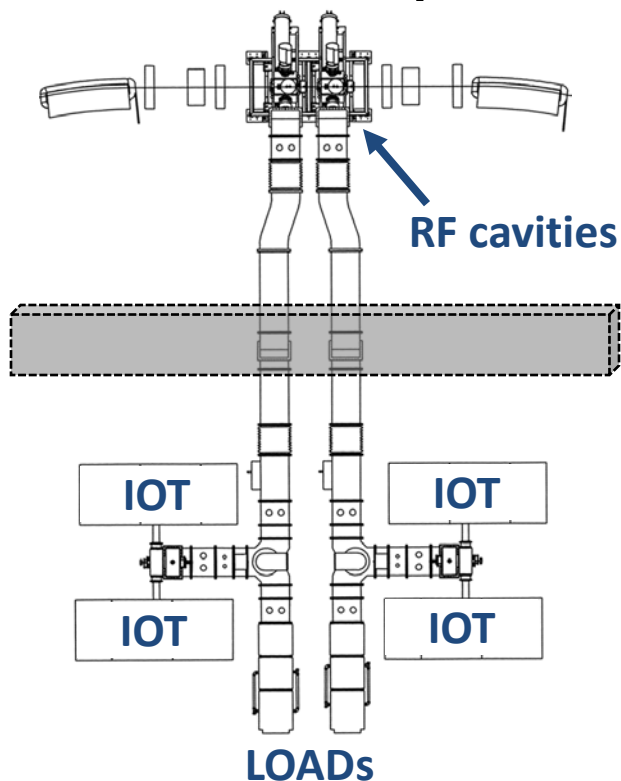
- *Actions to improve (I): 180° to 360° & invert during shutdowns*



- *Actions to improve (II):*
  - *Add hydraulic diagnostics*
  - *Add water characteristics measurements after consumption*
  - *Add protections against inlet high pressures*
  - *Add filters*
  - *Add local equipment to remove air*
  - *Modify top of the water tank to remove air*



- *SR-RF system: 6 CAVITIES & 12 IOTs*



- *IOTs (6/16 broken during SAT)*



- *Improvements*

- *Fake interlocks*

- Water interlocks
- Signals crosstalk

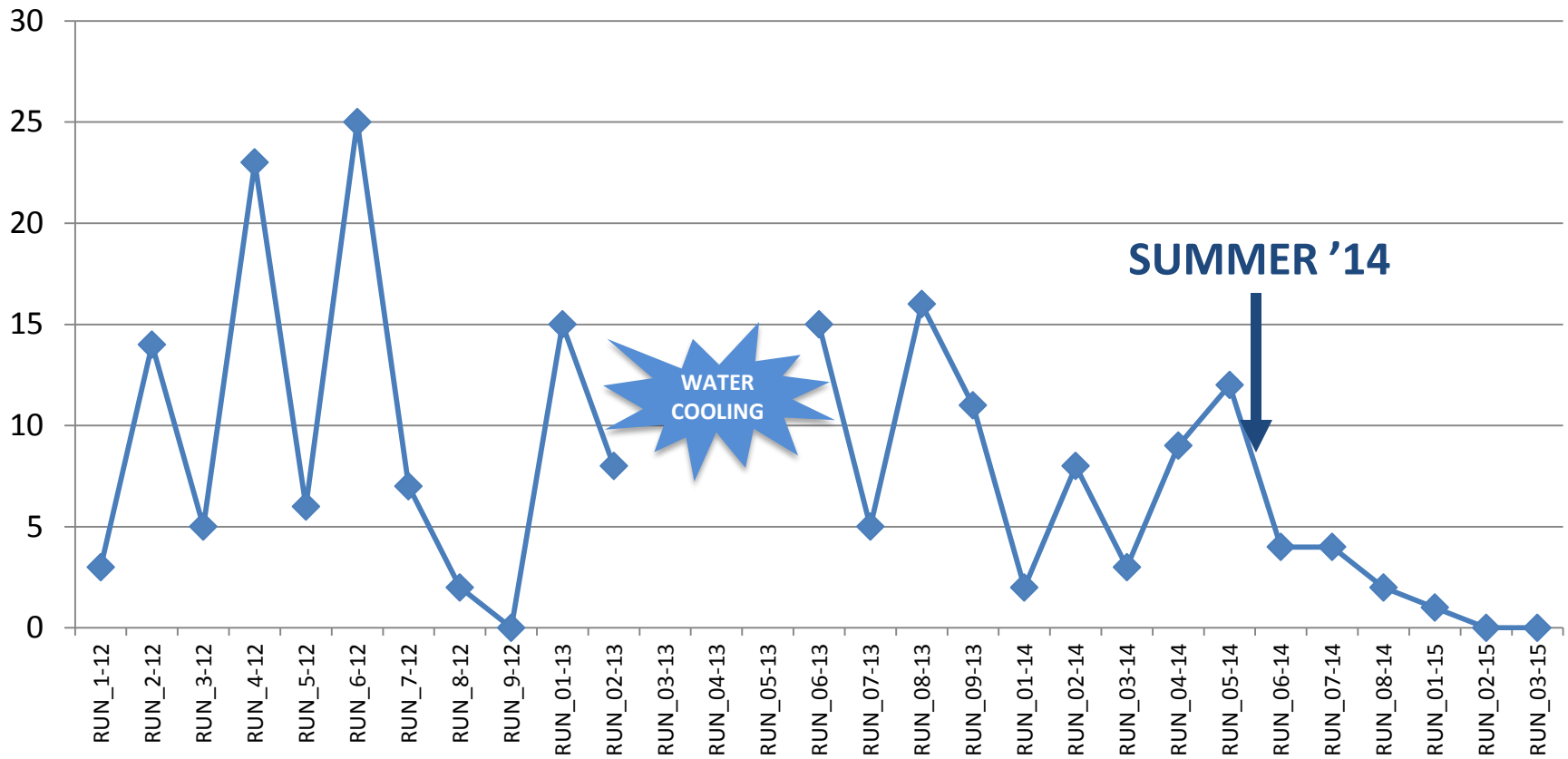
- *Body current*

- Procedure conditioning next Monday (summer '14)
- Procedure recover from body currents(summer '14)

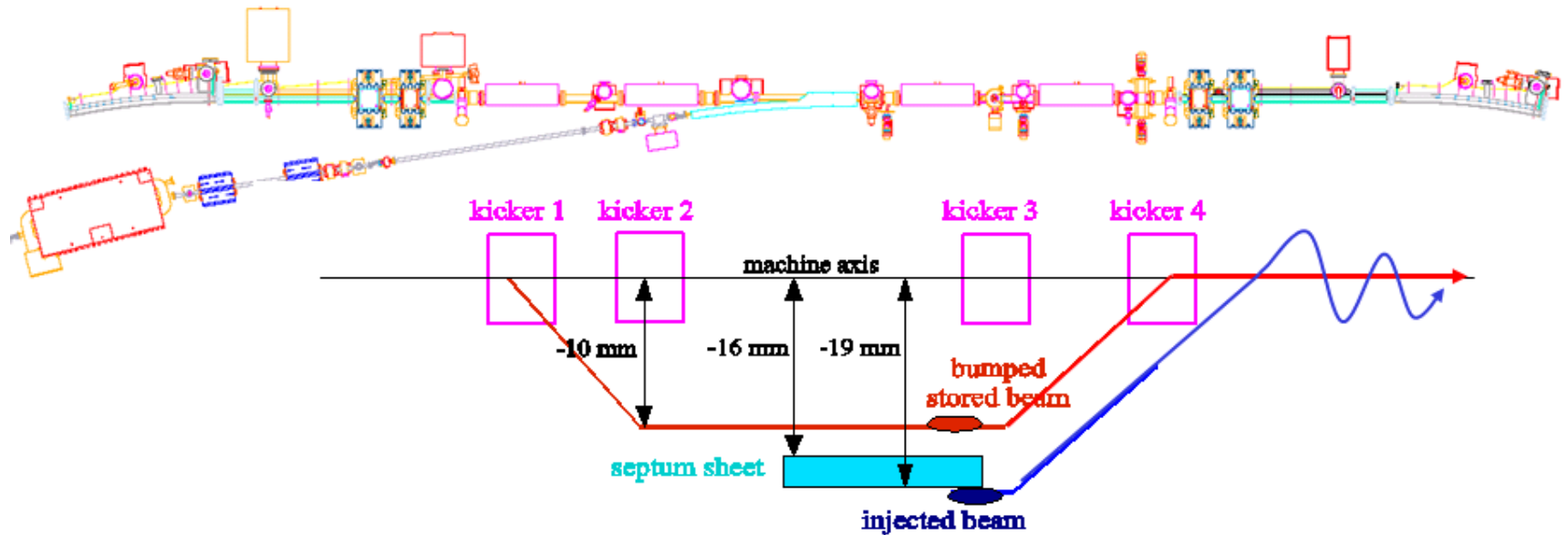
- *Voltage from 36kV to 32kV (summer '14)*

- *Old IOTs (>20000h) limited to 40kW (summer '14)*

- *Evolution of beam dumps due to RF*



# Improvements – Kicker shielding



- The thyristor driver board of kicker 02 of the storage ring had an erratic behavior: 1 trip/malfunctioning per month





# Improvements – Kicker shielding

- Damaged components: MOSFET IXDN614 and IXDI614, which are the gate drivers used to switch the thyristors
- A TLD radiation study showed high dose levels focused at kicker 2.

	KICKER 2	KICKER 3
GAMMA DOSE PER MONTH (Gy)	3300	8

- Polyethylene and lead shielding was installed. After shielding, failures disappeared





Thanks to  
A.Salom, M.Quispe, R.Petrocelli and M.Pont

Questions?