

# Keeping Linac 2 running until Linac 4

General statistics

Consolidation

Power

RF

Vacuum

Instrumentation

Source

General infrastructure

Conclusions

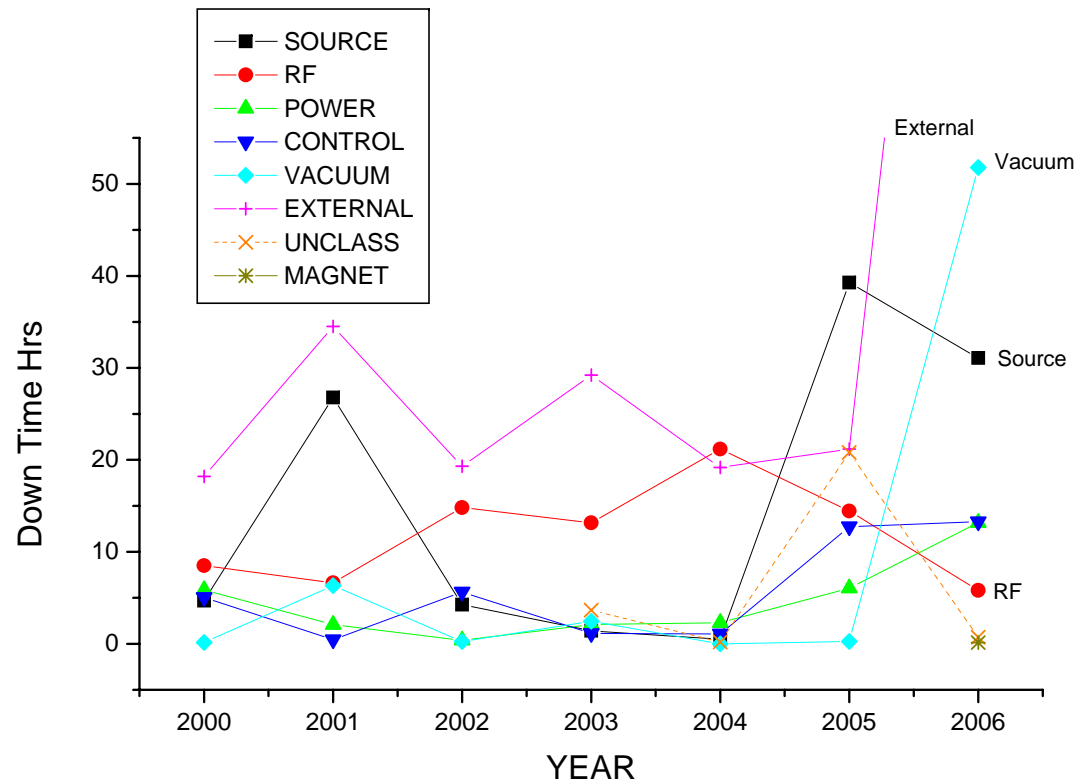
# General statistics

	Downtime (hrs)	
● Source	31.1	
● RF	5.8	
● Power	13.2	
● Control	13.3	
● Vacuum	51.8	(includes leak detection during MDs)
● Magnet	0.1	
● External	144.7	
● Unknown	0.7	

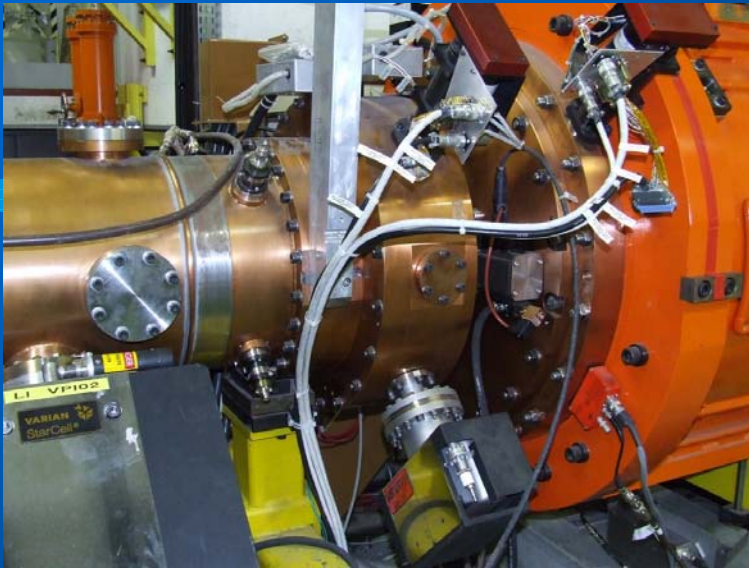
Downtime: Linac 2: 2.1% External: 2.6%

Linac 2 is not a major cause of downtime for the LHC injector chain.

# General statistics



- Vacuum in 2006 was an exception.
- Source needs more investigation.



Recently renovated



Candidate, not critical

Urgent



# Power Convertors

- Funded Consolidation:

#		For Start up	Cost(kCHF)
10	Steerer MiniDisCap	2007	45
2	Quad MaxiDisCap	2007	
45*	Quad MaxiDisCap	2008	770

- Not funded – not required if Linac 4 in 2011

#		Cost(kCHF)
3	Tekelec	330
1	RF Hazemeyer	300

- \* 45 represents ~50% of quad PCs. The low current Oltronix can remain in place until Linac 4.

# Radiofrequency

- In recent years, ~1MCHF of consolidation, leading to low fault times.
- 100kCHF consolidation / year on Linac 2 + Linac 3
- To be Done:
  - Mercury filled ignitrons need replacement with solid state switches
  - Solid State RF amplifiers need refurbishment
  - Renovation of spare tube amplifiers
  - Water cooling system, chassis spares, tuners cleaned...
- Not required:
  - HOM suppressors
  - RF Trombones renovation
- There are sufficient RF tubes

# Vacuum

- Large vacuum leak discovered on Tank 3.
- Inventory of accelerator shows many smaller leaks.
- The vacuum tightness of the Linac RF tanks and drift tubes is a long term weakness. Only secondary vacuum systems can be employed to mitigate problems. Ideal consolidation is new tanks => Linac 4.
- May need to change pumping groups on tanks if they have to run all year.

# Instrumentation

- Limited instrumentation on Linac 2 – BCT, position pick ups, 4 measurement lines.
- BCT renovation of electronics done in SD 2006.
- Position pick ups VERY old, few spares, but reliable. 1 has been replaced with a new design.
- Measurement lines:
  - Slit cooling to be moved to demin. water.
  - ATB working on consolidation plan for slit controls.



# Source

- Lower intensity and electrode failure at start of last 2 runs.
- Putting the test-stand back into operation.
- Source controls hardware based on CAN bus system. To be updated to a PLC based system.

# General Infrastructure

- Last Linac equipment to be moved to closed circuit cooling (SD2007).
- Repairs ongoing to roof (water leaks and corrosion).
- Should increase the Linac budget to allow infrastructure repairs.

## Conclusions and Final remarks

- Linac 2 still has low fault rates.
- Main causes of worry for next 5 years are:
  - The vacuum tightness of the RF tanks
  - The reoccurring source failures.
- Need to continue some consolidation for the next 2-3 years, and important routine maintenance. **Make sure there is time for this!**
- Need to treat the accelerator with care, keep a high level of inspections.
- Linac 2 must still serve as a back-up for 2 years after Linac 4 commissioned.
- **Linac 3** has not been considered, and has a longer future.