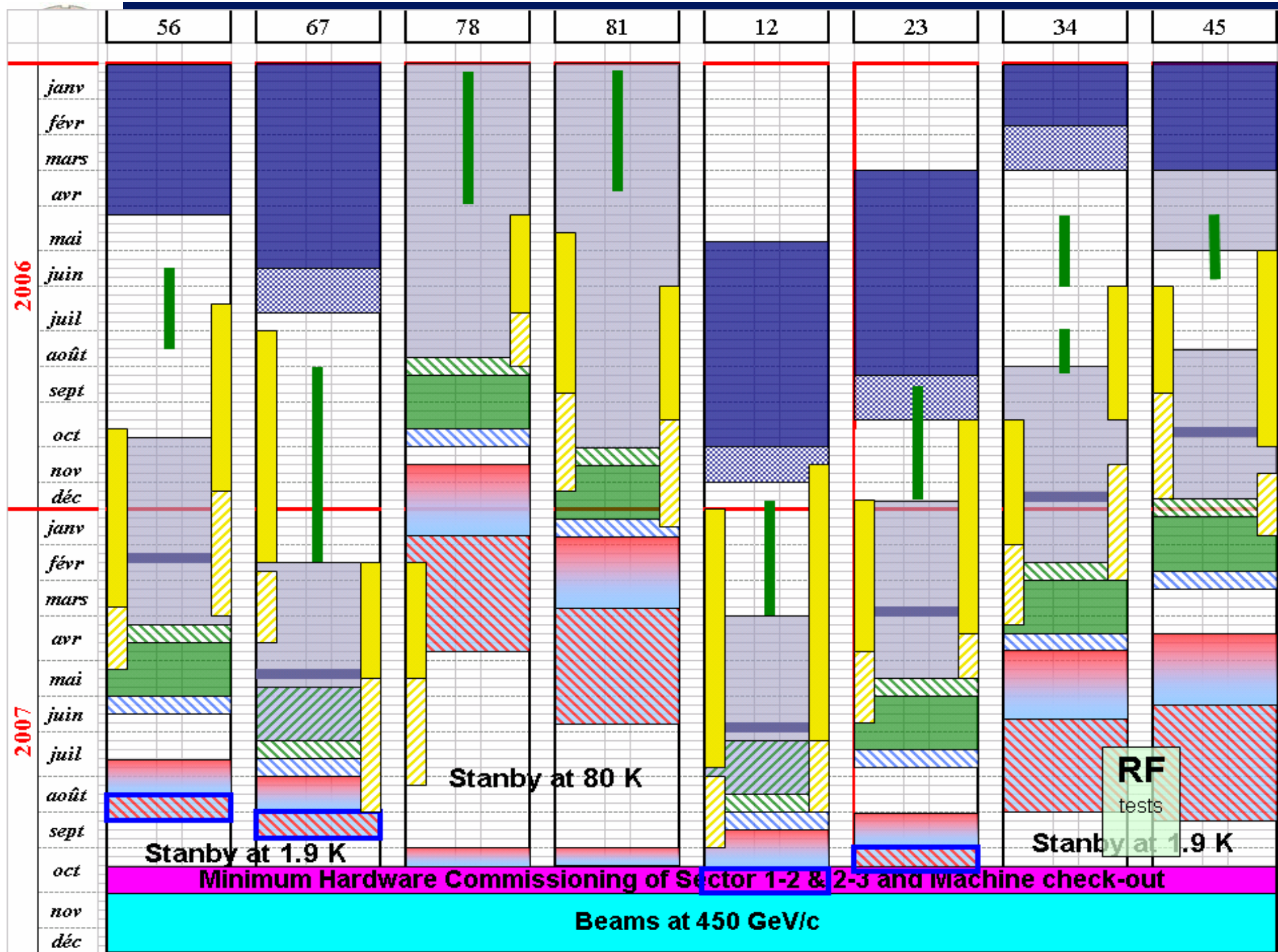
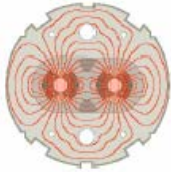


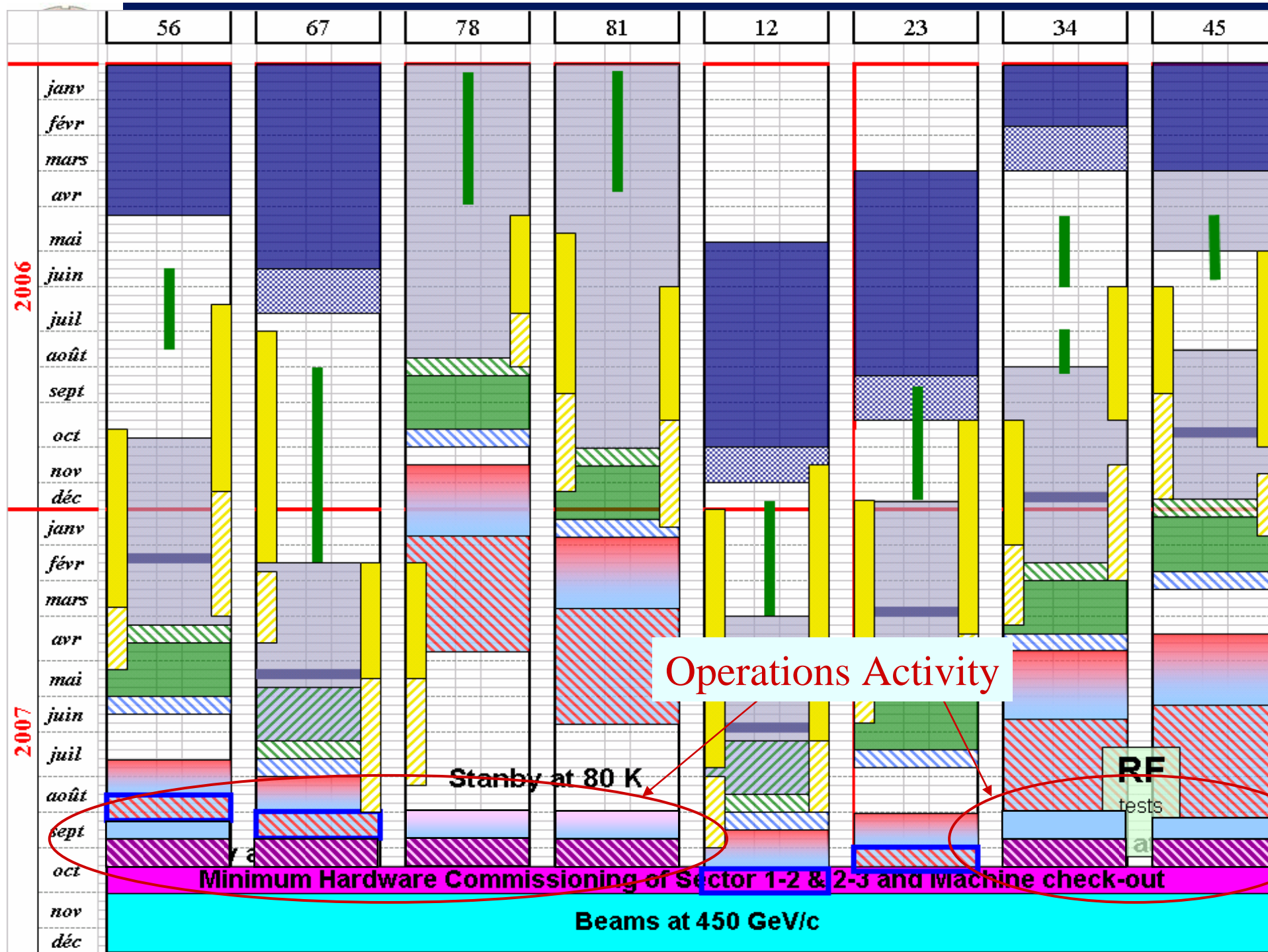
450GeV operation

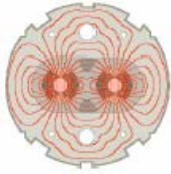




Assumptions at start of Machine Checkout

- **Power tests on magnet circuits**
 - **Sectors 78, 81, 34, 45 fully hardware commissioned beforehand**
 - Cycled to 7.2TeV with full protection systems
 - 7-8 8-1 kept below 80K after HWC
 - 3-4 4-5 kept at nominal operating temperature after HWC
 - **Sectors 56, 67 hardware commissioned for 450GeV beforehand**
 - Cycled to ~1TeV with limited protection systems
 - Kept at nominal operating temperature after HWC
 - **Sector 23 hardware commissioned for 450GeV just in time**
 - **Sector 12 cold**
- **All special function equipment has been tested**
 - Transfer lines
 - Injection systems
 - Extraction systems
 - RF
 - BI
 - Collimators
 - RP systems
 - MP systems (users)
- **Access and power interlock systems tested at the sector level**
- **Vacuum systems tested at the sector level**
- **Operations activity**
 - **Cool down sectors 78 and 81 back to nominal**
 - **Power circuits in sectors 56, 67, 78, 81, 34, 45 to ~1TeV**



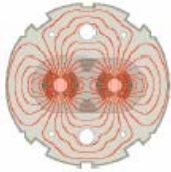


Machine checkout tasks (working 24/7)

- **Sector 12 - hardware commission for 450GeV (dedicated)** 14 days
- **Access system (dedicated)**
 - Close machine and experimental areas (patrols) 2 days
 - Full systematic check of whole machine 4 days
 - SAS
 - Doors
 - EIS
 - DSO tests 1 day
 - INB tests (just before beam) 1 day
- **Vacuum system (dedicated)** 4 days
 - All valves out
 - Pressure profiles around the ring
 - Interlock tests (move valve and check beam dump and beam permit)
- **Switch all on/off/on (interleaved with above – nights)** 0 days
- **Download settings, cycle and set to 450GeV (interleaved)** 0 days
- **Establish beam permit (machine protection system)** 2 days

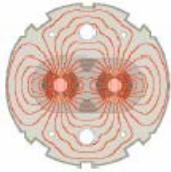
Exclusive
Activities

14 days HC + 14 days MCO



Machine checkout and later

	56	67	78	81	12	23	34	45
Oct						Minimum HWC		
	Operations testing				Minimum HWC	Operations testing		
Nov	Full Machine Checkout (Access, Vacuum, Equipment Tests, Cycle and Set, BIC and INB)							
	Beam Commissioning to 450GeV 16days estimated, 60%efficiency assumed							
Dec	Engineering run (Collisions at 450GeV + Ramp Commissioning)							

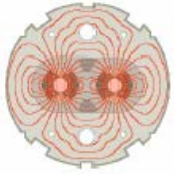


Calibration run in 2007



k_b	43	43	156	156
$i_b (10^{10})$	2	4	4	10
$\beta^* (m)$	18	6	6	6
luminosity	10^{28}	$1.3 \cdot 10^{29}$	$4.8 \cdot 10^{29}$	$3 \cdot 10^{30}$
event rate ¹ (kHz)	0.4	5	20	120
W rate ² (per 24h)	1	11	41	257
Z rate ³ (per 24h)	0.1	1	4	25

1. Assuming 450GeV inelastic cross section 40mb
2. Assuming 450GeV cross section $W \rightarrow l\nu$ 1nb
3. Assuming 450GeV cross section $Z \rightarrow ll$ 100pb



Staged commissioning plan for protons @7TeV

