

Status of the BSRA

BE-BI-PM



BSRA

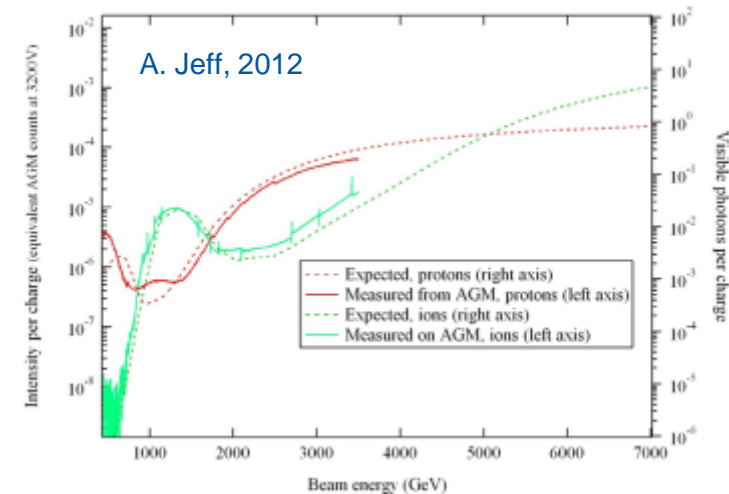
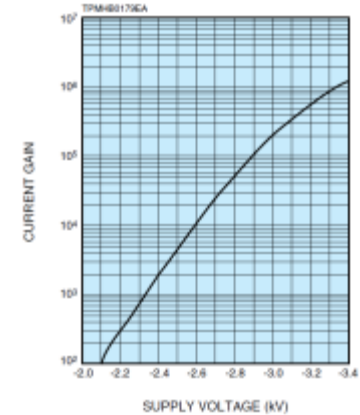
- The Abort Gap (AG) monitor (BSRA) monitors the AG population by measuring the Synchrotron Light (SL) emitted by a SC undulator ($E < 1.5$ TeV) and a D3 dipole ($E > 1.5$ TeV).
- MCP-PMT Broadband measurement: 200-800 nm
- After LS1, BSRA will eventually be connected to the interlock system.
- Improvement of reliability: optical line and software

Software: automatic calibration

- Introduction of automatic calibrations:
 - Before injection: voltage-gain calibration with external source (no beam):

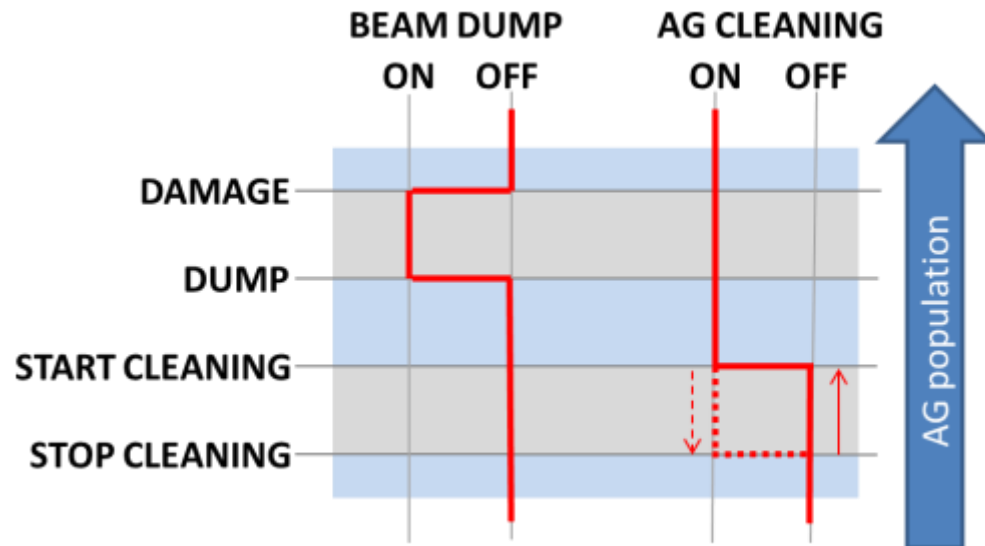
$$G(V) = G_0 10^{aV^2 + bV}$$

- Injection, with pilot beam @ 450 GeV: measured SL originated from a single particle (needs normalisation of FBCT signal)
- Periodic system check (every hour TBC): measure a bunch of known intensity, compare with FBCT signal



Software: thresholds and flags

- The BSRA publishes two flags: “AG cleaning” and “beam dump”
- The flags logic determined by threshold levels:

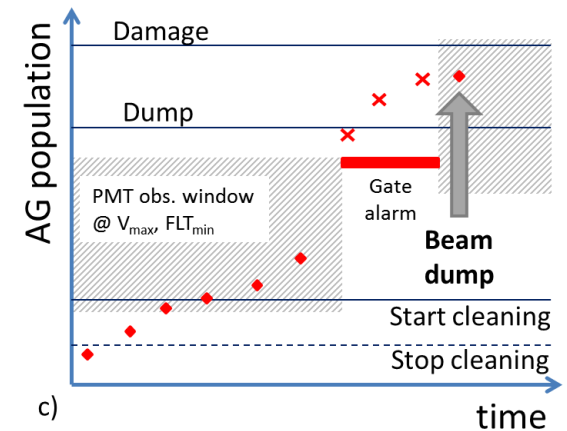
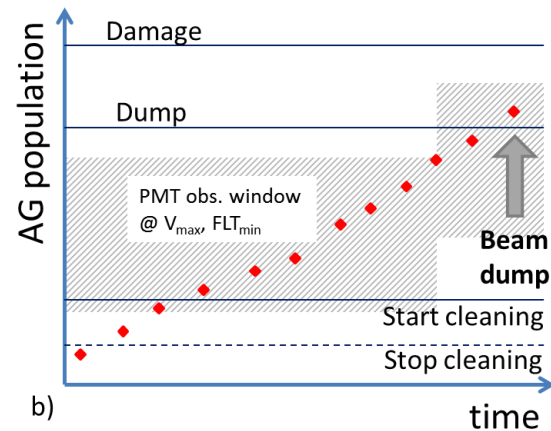
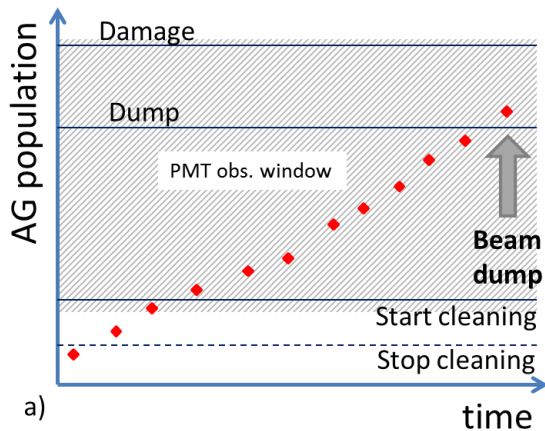


AG cleaning

- When 5 reading out of the last 10 are above the AG cleaning threshold and beam mode is not RAMP and no errors or alarms are present.
- When AG population is decreasing, stop cleaning threshold some 10% (TBC) lower.

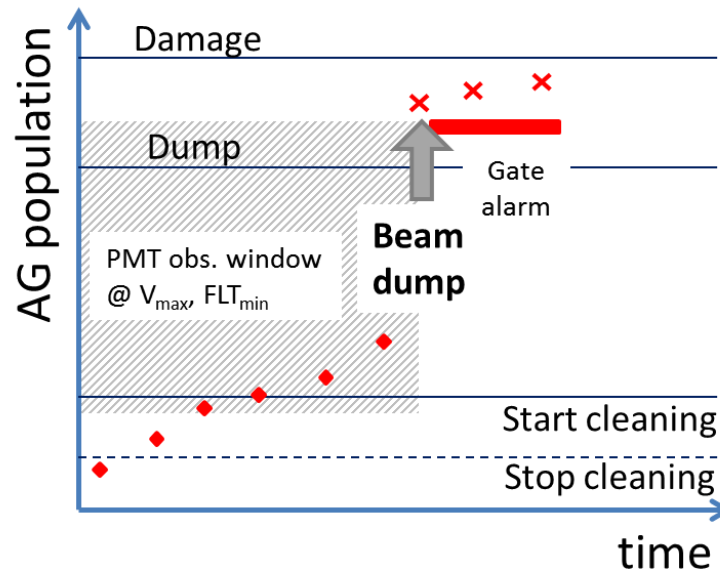
Beam dump

- PMT gate protection determines BSRA behaviour.
- When signal can be followed by the HV/filters feedback:

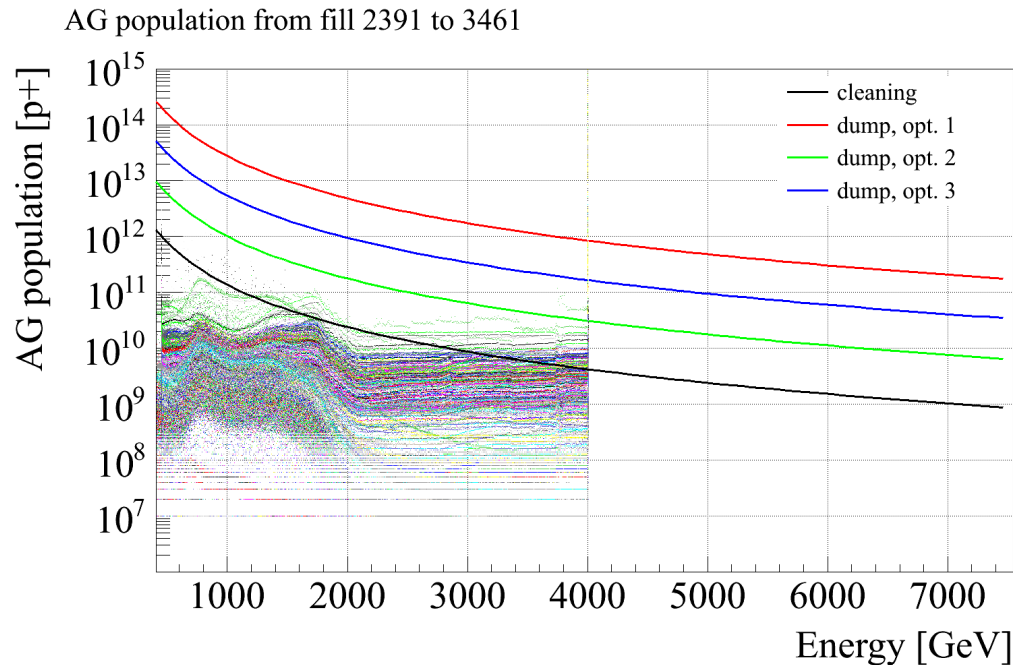


Beam dump

- When signal increases abruptly and gate alarm above the dump threshold: beam dumped even in presence of gate alarm.



Thresholds



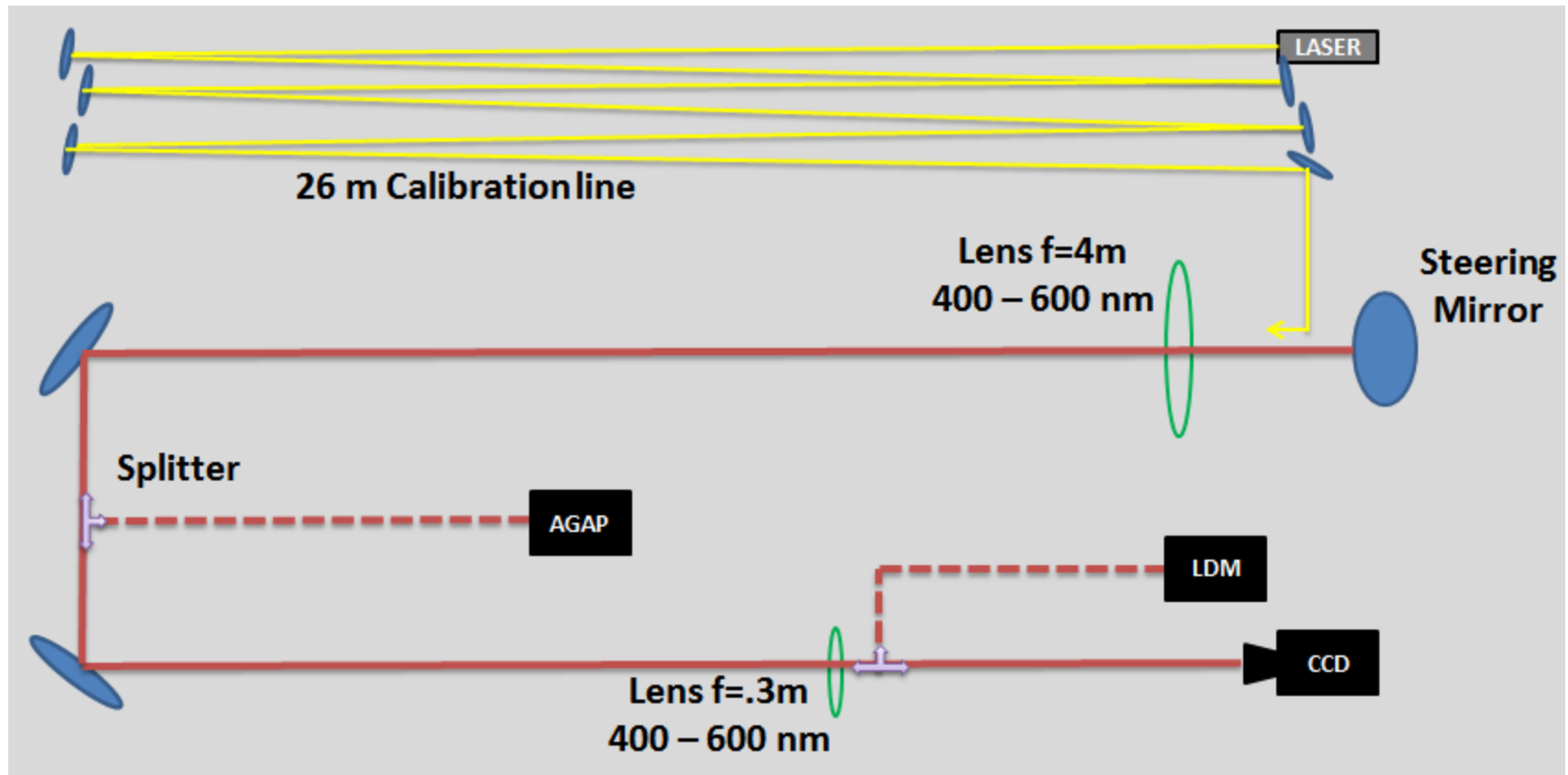
- Values of thresholds still to be defined precisely:
 - start cleaning approx. 10% of min Q4-Q5 quench level (around $1e+09$ @ 6.5 TeV).
 - Dump: around 40x quench level ($4e+10$)
 - Damage: 400x (?)

Final remarks

- EDMS document 1337184 “Calibration procedures and automated actions for the Abort Gap Monitors of LHC” to be finalised.
- Software development started (S. Bart).
- Parasitic MD to calibrate new optical line.

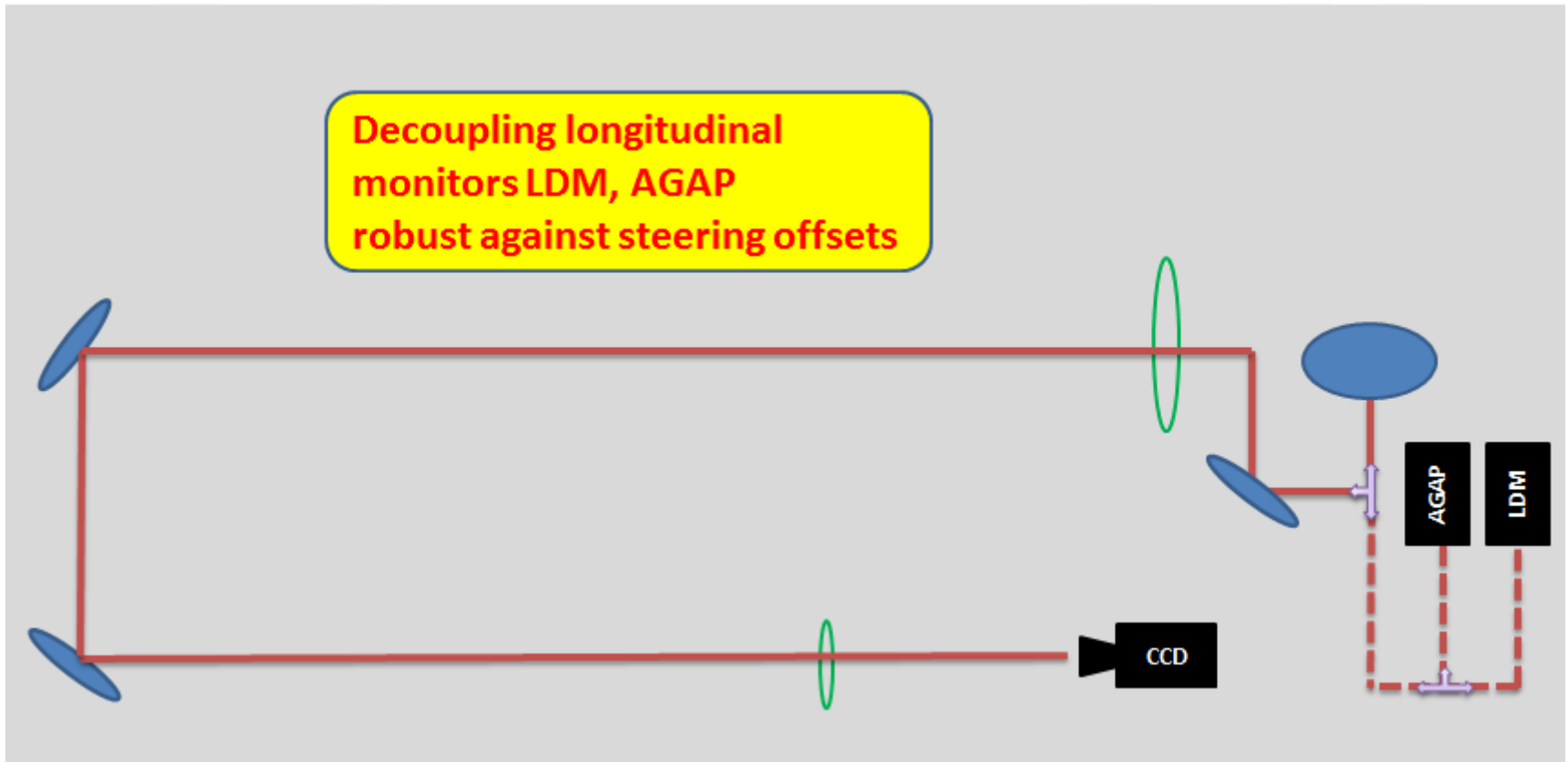
Extra

BSRT Optical Table Layout end of 2012



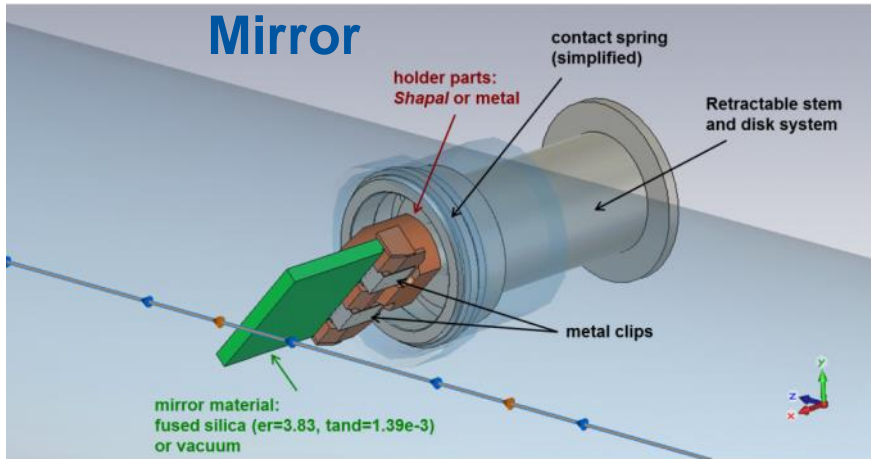
Extra

New BSRT Optical Table Layout

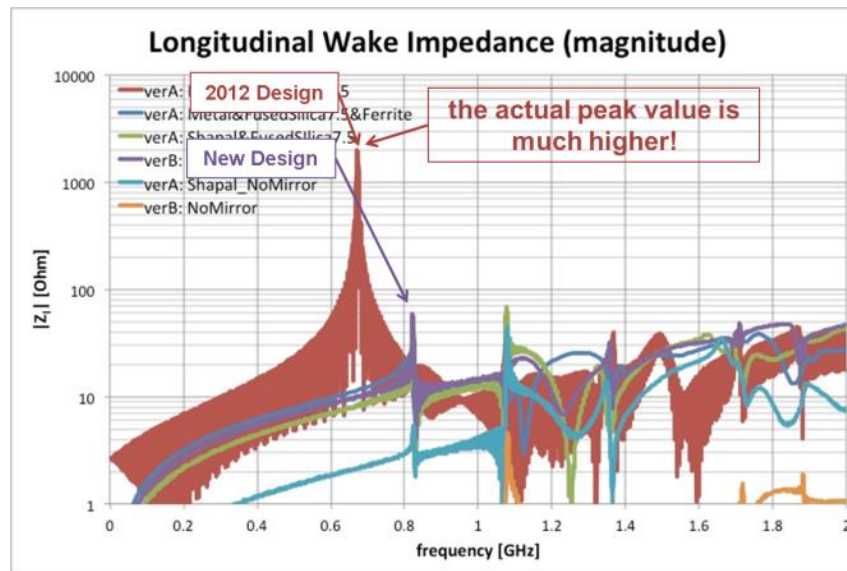
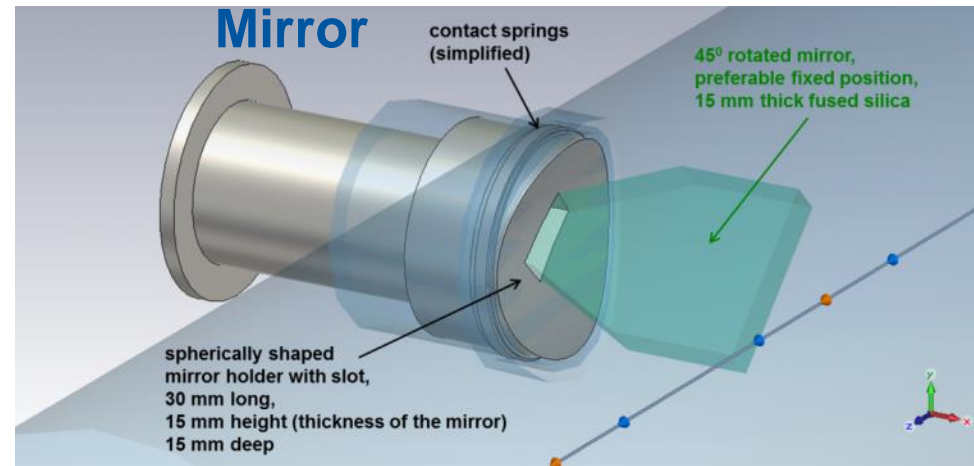


Extra

OLD Extraction Mirror



NEW Extraction Mirror



G. Trad, Evian 2014