Status of the ASTRID2 facility

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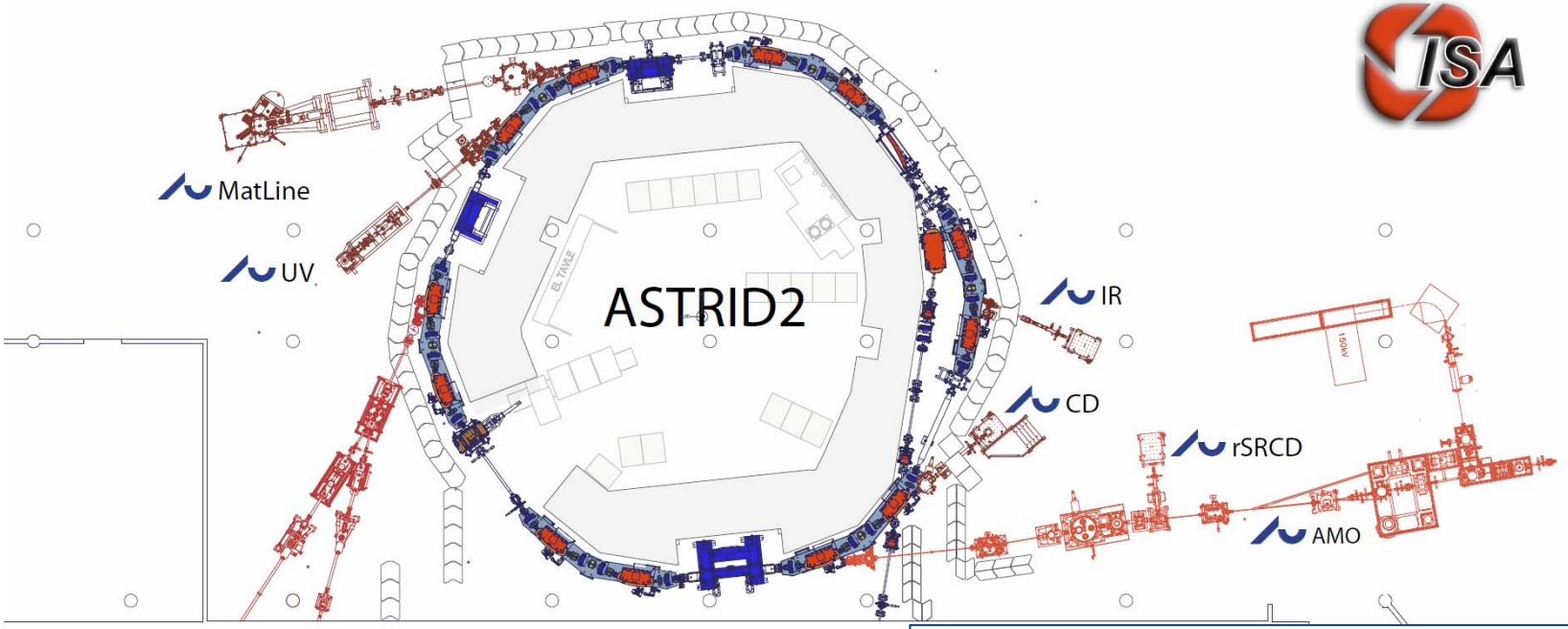
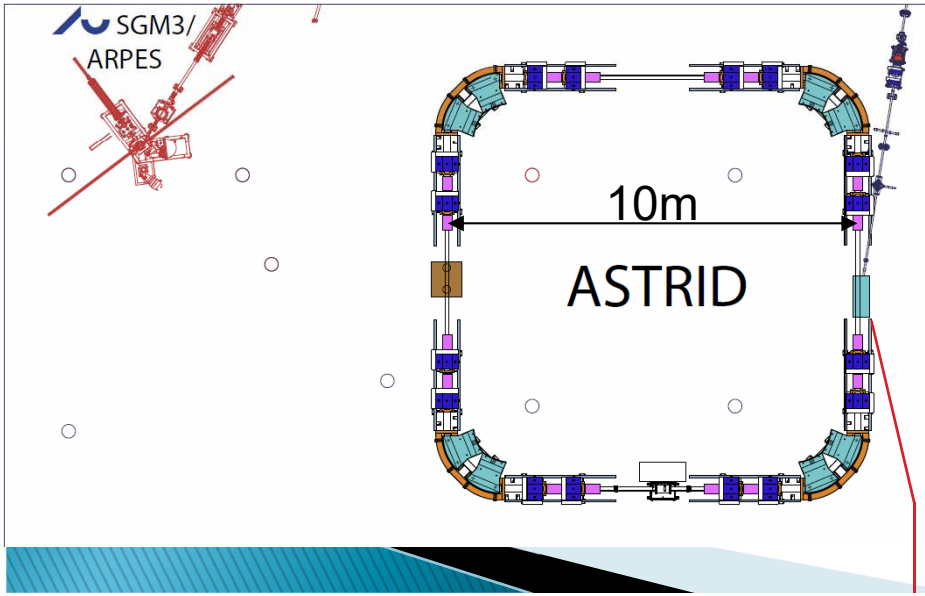
ASTRID2

- ASTRID2 is the new synchrotron light source in Aarhus, Denmark, since 2013
- ASTRID2 main parameters
  - Electron energy: 580 MeV
  - Emittance: 12 nm
  - Beam Current: 200 mA (presently 180 mA)
  - Circumference: 45.7 m
  - 6-fold symmetry
    - lattice: DBA with 12 combined function dipole magnets
      - Integrated quadrupole gradient
  - 4 straight sections for insertion devices
  - Using ASTRID as booster (full energy injection)
    - Allows top-up operation

The ASTRID 2 facility



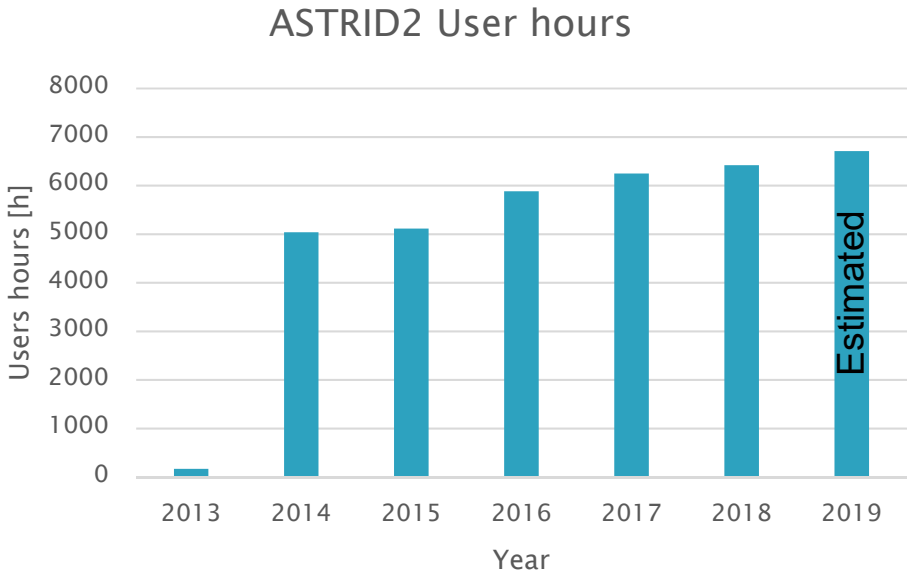


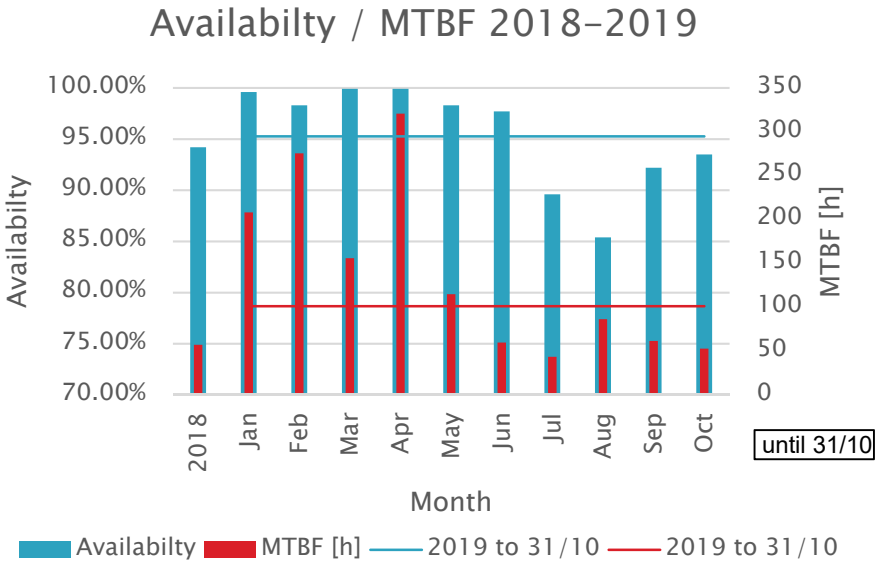
ASTRID2 main parameters

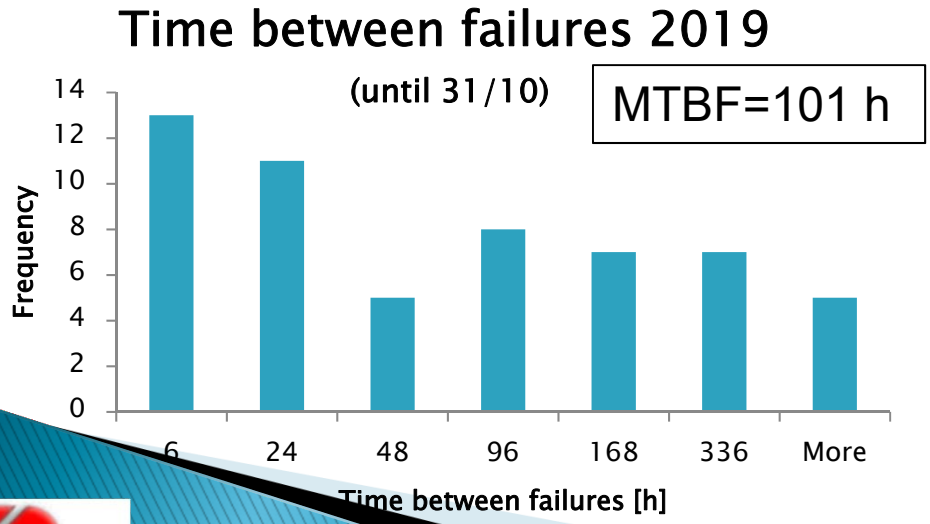
Circumference	45.71m
Energy	580MeV
Current	200mA
Characteristic energy	257eV
RF frequency	105MHz
Harmonic	16
Horiz. emittance	12nmrad
#Straight sections	6
Length of straight sections	2.82m
#ID's	3

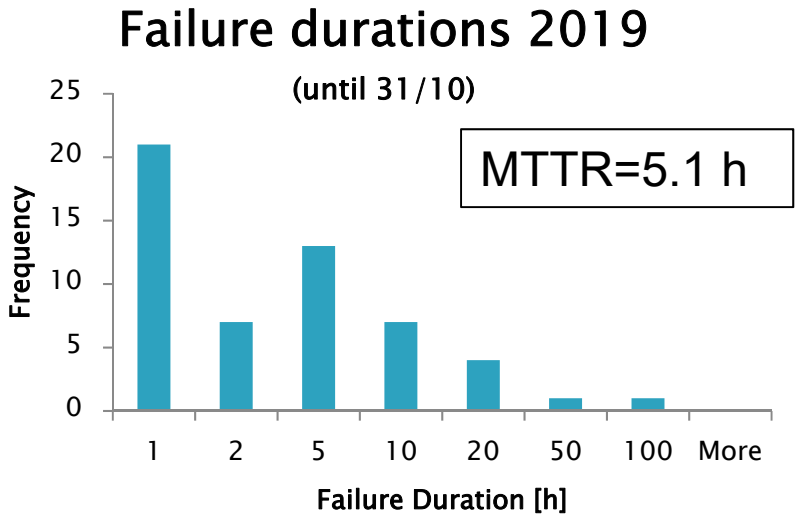
User hours and reliability

Downtime if current goes below 90% of topup set current









Failures

- 2019 has been better than last year
  - MTBF: 2018: ~50 h, 2019: ~100 h (until now)
- Jul.–Sep.: ASTRID septum supply
  - Undetected transistor failures
  - ~6 days lost because of two weekends and one night
- Sep.: Astrid2 RF system
  - Failure of new circulator dump
  - 0.5 day lost because of evening and night
- Oct.: Microtron
  - A spark turned everything off
  - 0.5 day lost because of evening and night
- Plus various smaller issues

“Large” circulator

- Installed a 8 kW circulator at ASTRID2 RF system
  - Only allow 2 kW reflected power in steady state
    - LLRF insures reflected power <2 kW continuously
- Added more monitoring and interlock of reflected power
- Allows us to run at somewhat higher cavity amplitudes, but beam lifetime turned out not to improve
  - Previously had various errors running with high power out of the amplifier (temperature interlocks, …)
- Circulator load failed due to poor assembly
  - Repaired by manufacturer

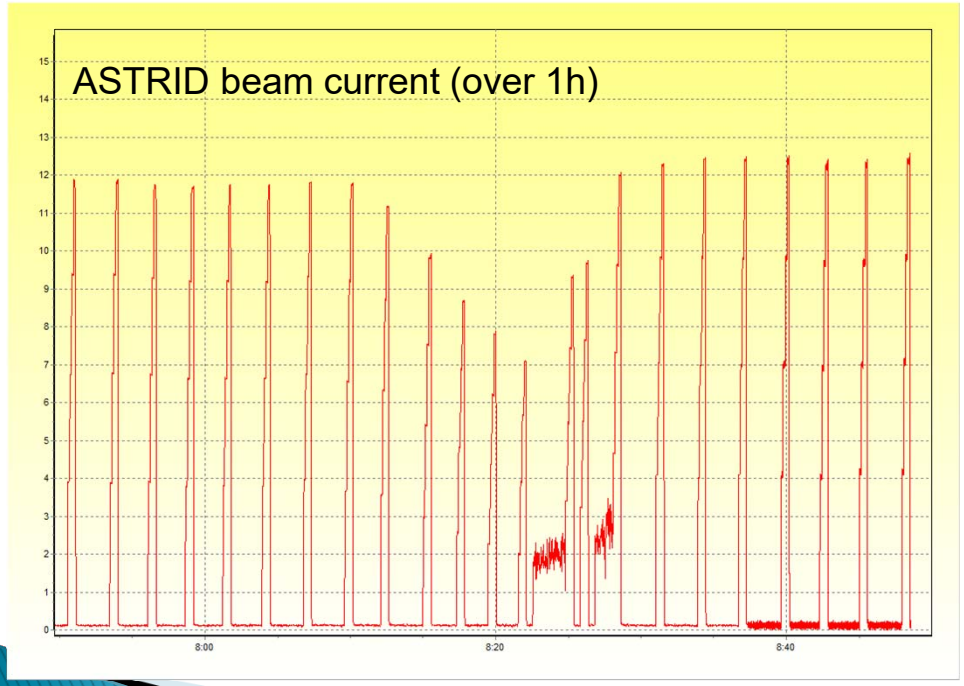
Microtron klystron HV problems

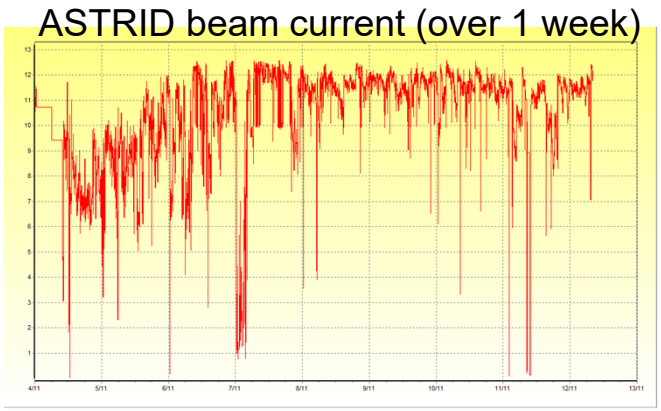
- We have had some problems with the Microtron klystron HV, which suddenly decreases and then slowly over several hours return to normal
  - At the same time the klystron RF gain INCREASES
  - Believe it is caused by impedance changes of klystron
- The problem seems to go away if we run the klystron at a lower filament current
- By measuring klystron "heating curves" (klystron HV current Vs. klystron filament current) we have determined that we were running the klystron at too high a filament current
  - Filament current needs to be lowered as klystron is aging!
- Klystron has been running about 140000 hours
  - So we are considering replacement (have an old spare)

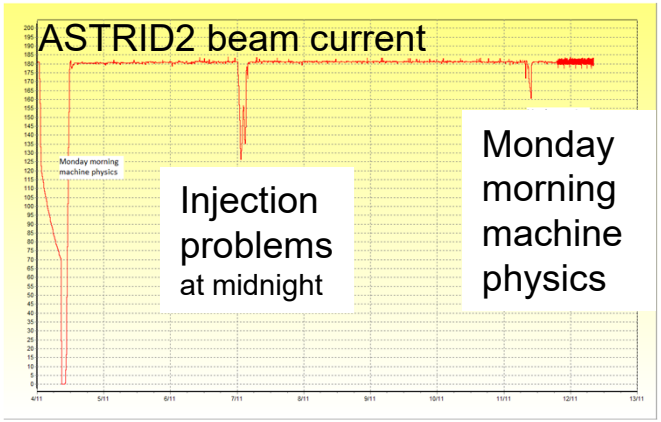
- Thanks to all who helped us with ideas and suggestions

Microtron AutoAlign program

- To circumvent drifts we have developed a small program which regularly does an alignment of some of the microtron parameters
  - Quite simple: Just simple adjustments a little up and down to determine optimum value and then just simple iteration between the parameters
  - But very effective







Network problems

- New Cisco C9300 switches gave quite some trouble
  - Some devices incorrectly made broadcast ARP responses (instead of unicast ARP response). These wrong network packages are being blocked by the new switches (and not the old Cisco C2960S)
    - Basler cameras (ACE acA640-100gm)
      - Presently using an old switch as “gateway”
      - Basler has acknowledged the problem, but will not do anything because the acA640-100gm is an old model
      - Have bought a few new cameras (ACE acA640-121gm), which does not have the problem
    - Gamma Vacuum SPCe vacuum pump controller
      - New firmware has solved the issue

Thank you for your attention

ASTRID2 Layout