

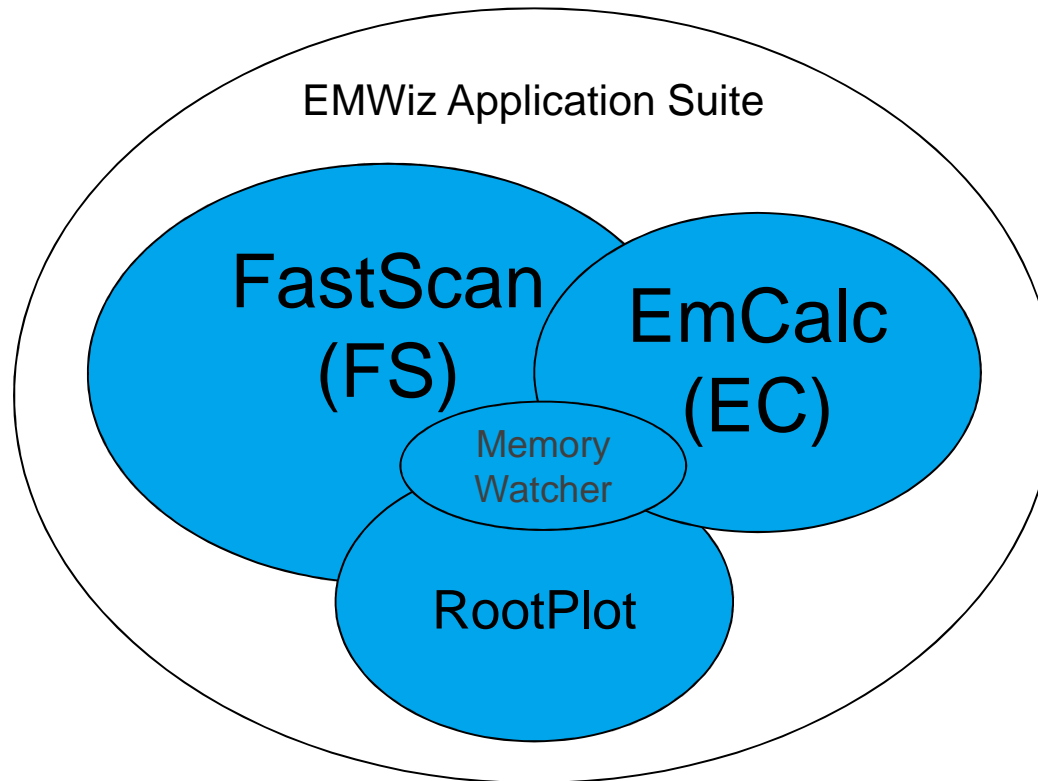
# EMWiz – 2016a

## Emittance Measurement Wizard

- FastScan
- EmCalc
- RootPlot
- MemoryWatcher

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> EMWiz: **E**mittance **M**easurement **W**izard



<http://blog.subkuhtan.de/wp-content/uploads/2008/11/wildnis.jpg>

- > First release of 2016 -> “2016a”
  - previous version at PIZ: May 11, 2015
  
- > Commands in Linux-terminal: **fastscan3\_test, emcalc3\_test**
  - Release Candidate dated Apr 22, 2016
  
  - Commands ‘fastscan3’ and ‘emcalc3’ currently **not** available
    - (as this is a release candidate version, people should be aware of it; if there are no major issues during first weeks of shift use, release candidate will be moved to ‘fastscan3’ and ‘emcalc3’ commands, while fastscan3\_test and emcalc3\_test will not be available until there is a more recent version to be tested in parallel to the production version)
  
  - EMWiz applications from 2015 can be made available if necessary, but are dangerous to be called, because main data storage and report path are hardcoded to 2015, although it’s not clear whether data would be overwritten

## Changes

# EMWiz – 2016a

## Changes

- > LDrift value is now part of must haves
- > .must file is now XML style (human-readable, human-editable, possible to have inherent documentation)
- > Main paths from now on loaded from emwiz-config.xml, not hardcoded as in the past
  - /doocs/measure/TransvPhSp/2016/ProjEmittance
  - /doocs/measure/TransvPhSp/2016/ProjEmittance/reports
- > Lots of changes with hope to improve robustness
  - while scanning, recording additional property values together with images and actuator position should be more stable now
  - while scanning, multi-threading has been improved
  - printing to eps file, lpr command (emsy spot to logbook iirc)
  - ...

# EMWiz – 2016a

## example.must (XML)

```
<?xml version="1.0" ?>
<MustHaves>
  <AfterGun>
    <BeamMeanMomentum> 6.096 </BeamMeanMomentum> <!-- BMM: [MeV/c], Emwiz: GunMom-->
    <BeamMomentumSpread> 12.9 </BeamMomentumSpread> <!-- BMS: [keV/c], Emwiz: GunMomRMS -->

    <GunPhase-minus-MMMG> 0.0 </GunPhase-minus-MMMG> <!-- GPmM: [deg], Emwiz: GunPhase, "Gun Phase - MMMG"
                                     MMMG: Maximum Mean Momentum Gain -->
  </AfterGun>

  <AfterBooster>
    <BeamMeanMomentum> 21.622 </BeamMeanMomentum> <!-- BMM: [MeV/c], Emwiz: MeanMom -->
    <BeamMomentumSpread> 38.0 </BeamMomentumSpread> <!-- BMS: [keV/c], Emwiz: MeanMomRMS -->
    <BoosterPhase-minus-MMMG> 0.0 </BoosterPhase-minus-MMMG> <!-- BPmM: [deg], Emwiz: BooPhase -->
  </AfterBooster>

  <LaserBeam>
    <Xrms> 0.288270 </Xrms> <!-- Xrms: [mm], RMS of laser beam shape (X), Emwiz: Xini -->
    <Yrms> 0.305116 </Yrms> <!-- Yrms: [mm], RMS of laser beam shape (Y), Emwiz: Yini -->
    <RiseTime> 0.0 </RiseTime> <!-- Rt: [ps], Rise time, Emwiz: Rt -->
    <FallTime> 0.0 </FallTime> <!-- Ft: [ps], Fall time, Emwiz: Lt -->
    <FWHM> 11.5 </FWHM> <!-- FWHM: [ps], Full Width Half Maximum, Emwiz: FWHM -->
  </LaserBeam>

  <ActuatorSpeed> 0.1 </ActuatorSpeed> <!-- AS: [mm/s], Emwiz: actspeed -->

  <LDrift> 3.133 </LDrift> <!-- LD: [m], Drift Length, Emwiz: m_dLDrift -->
</MustHaves>
```

ATTN: Whitespace characters (not recommended) have been added to enhance readability.

# EMWiz – 2016a

## emwiz-config.xml

Only experts need to know the following details:

- emwiz-config.xml is located in the folder where the binary files are located.
  - /doocs/bin/emwiz/ (fastscan3, emcalc3)
  - /doocs/develop/sweisse/emwiz/test-apr14-2016 (for current fastscan3\_test, emcalc3\_test)

```
<?xml version="1.0" ?>

<EMWiz>

  <!-- MDF: string containing e.g. '/afs/afh.de/group/pitz/doocs/measure/TransvPhSp/2016/ProjEmittance' -->
  <MainDataFolder>/afs/afh.de/group/pitz/doocs/measure/TransvPhSp/2016/ProjEmittance</MainDataFolder>

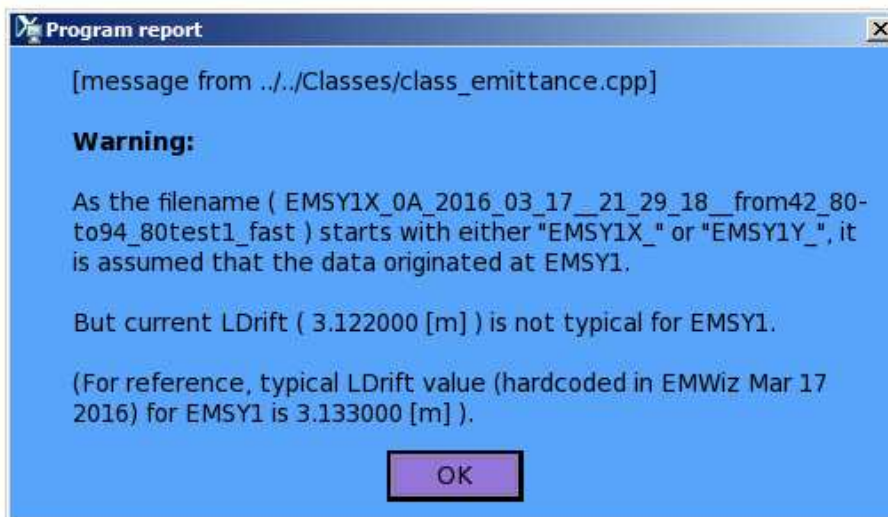
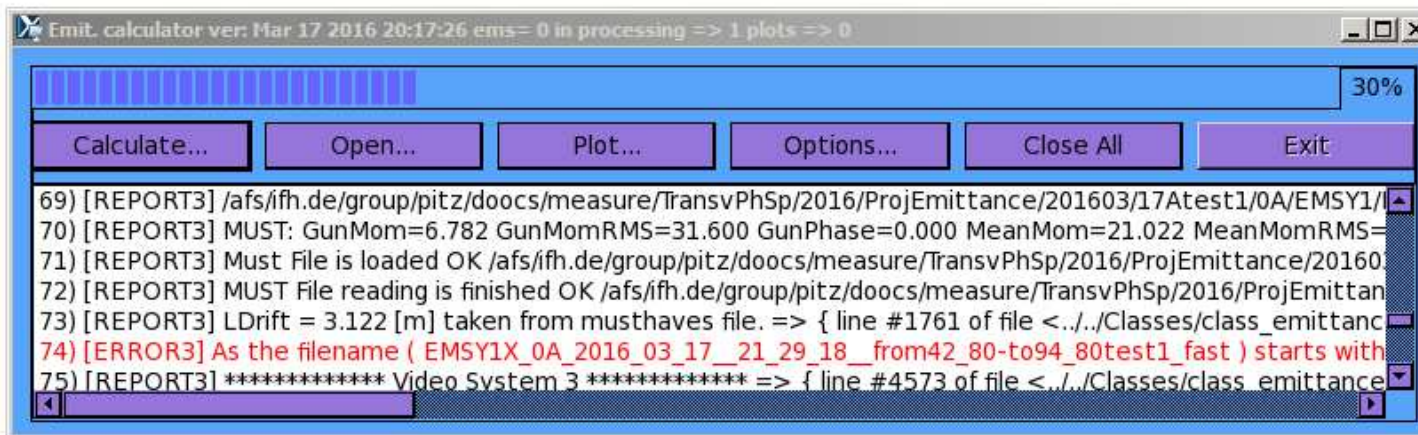
  <!-- MRF: string containing e.g. '/afs/afh.de/group/pitz/doocs/measure/TransvPhSp/2016/ProjEmittance/reports'-->
  <MainReportFolder>/afs/afh.de/group/pitz/doocs/measure/TransvPhSp/2016/ProjEmittance/reports</MainReportFolder>

</EMWiz>
```

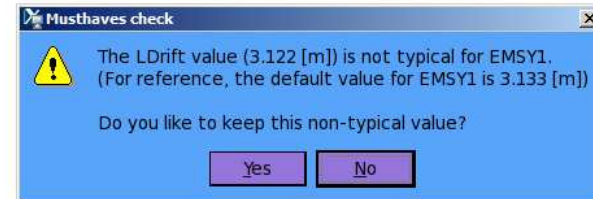
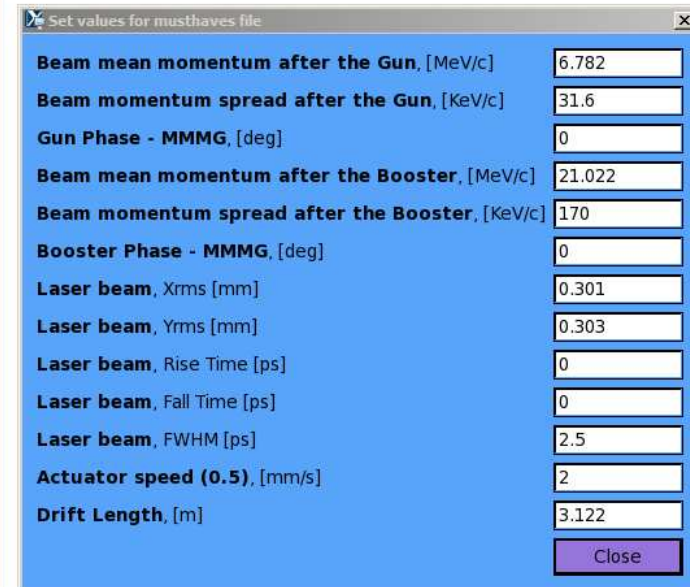
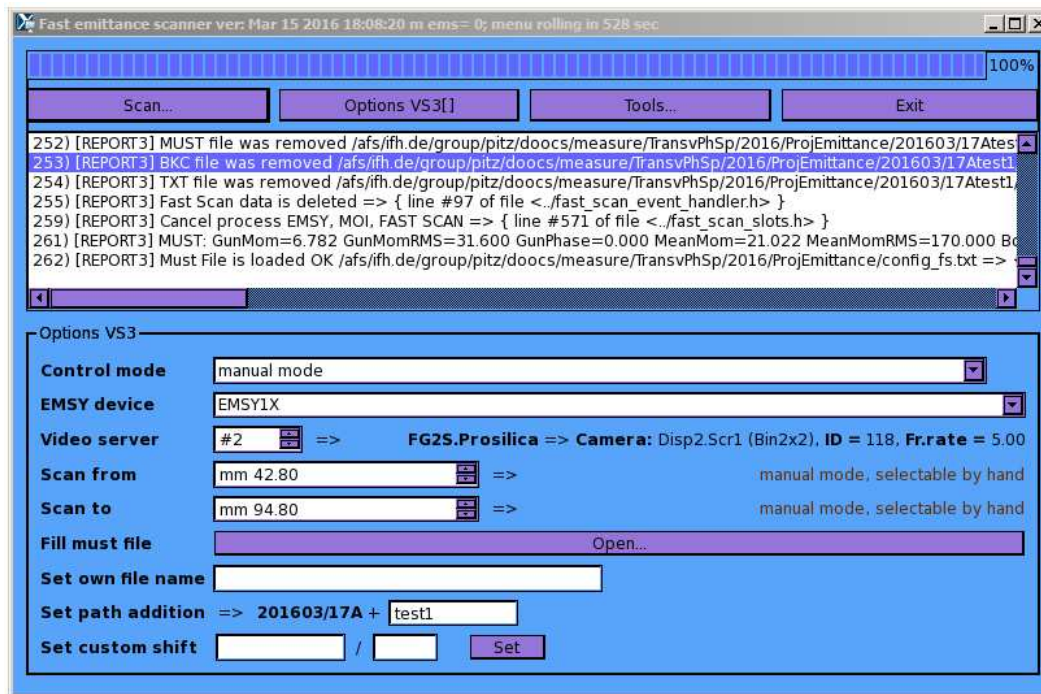


## GUI Extension Screenshot: EmCalc

- Warning dialogs if LDrift differs from a common value
  - common LDrift value is hardcoded in EMWiz applications (different for each EMSY station)

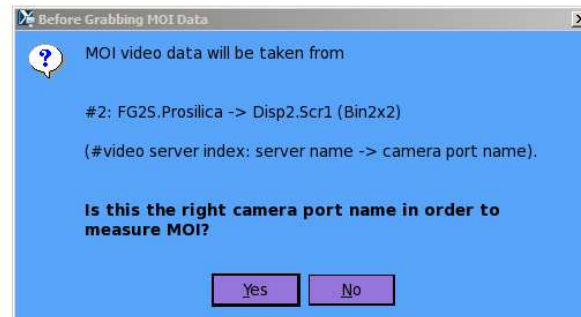
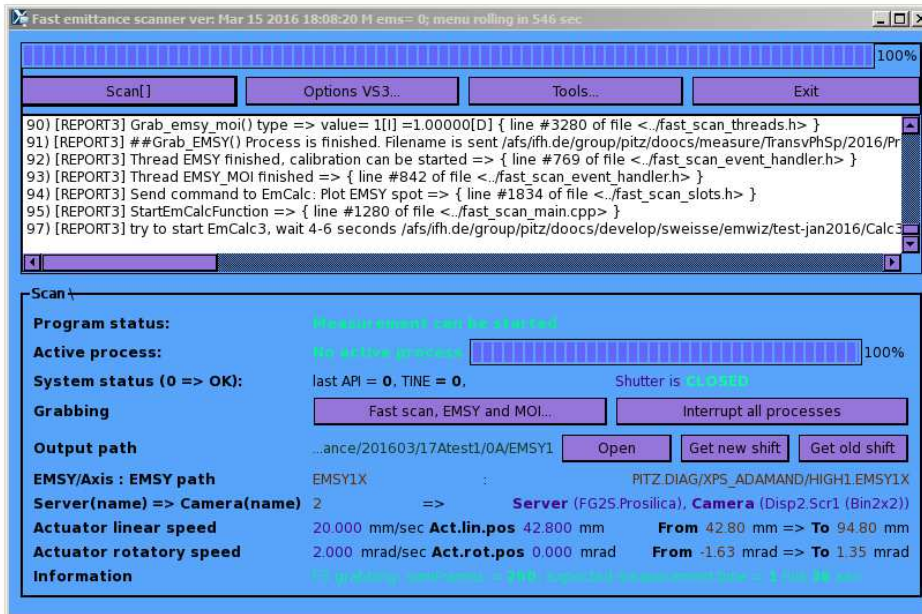


- Warning dialogs if LDrift differs from a common value
  - common LDrift value is hardcoded in EMWiz applications (different for each EMSY station)



## GUI Extension Screenshot: FastScan

- Dialog box asks user if the correct video source for taking moi has been selected



## Known Issues

## Shared memory (shm) communication

- Message passing, Data transfer (huge, e.g.: plot data)
  - Current implementation: There is just one shm slice per host, not one slice per user
- > If 2 users want to run EmCalc in parallel (on the same host), there will be a conflict (second user cannot run application as long as application is run by first user)
- > Choice:
1. choose another host
  2. communicate with the other user
  3. wait a while (dialog should tell how long), because in case first user has left, shared memory will be freed after some time of inactivity (6 hours)
- > Refactoring of shared memory communication is desirable, but the hardest task of the open points. My recommendation: As long as it is stable enough, keep it as it is.

### HOSTS (PITZ SL6)

e.g. pitz-wgs3, pitz-wgs2, pitz-wgs1,  
nomos29, pepe94, ....

- > Most additional properties recorded are neither used nor checked
  - Exception: number of laser pulses, main solenoid readback, bunch charge ...
- > Control System communication is made in such a way that anything needs to work perfect, otherwise it breaks easily
  - it would require a certain non-neglectible amount of time in order refactor this
  - My recommendation: right now better keep as it is instead of re-write it (from scratch), because if made new, it may need few iterations until it's working stable
- > 10 Hz assumption (10 shots per second, 10 video images per second) assumption is made on some parts of the software
  - as long as FS takes data when replate of facility is set to 10 Hz, this is perfectly fine
  - In case of different repetition rate:
    - Whether it affects measurement results (values) is not clear to me, probability is low
    - It affect amount of time a measurement takes (it takes more time than necessary)

### Next Steps?

- > Get experience by shift/operator use (does it work stable?)
- > Based on shift feedback continue software development, if necessary
  
- > Anything else?