SXP beam transport system

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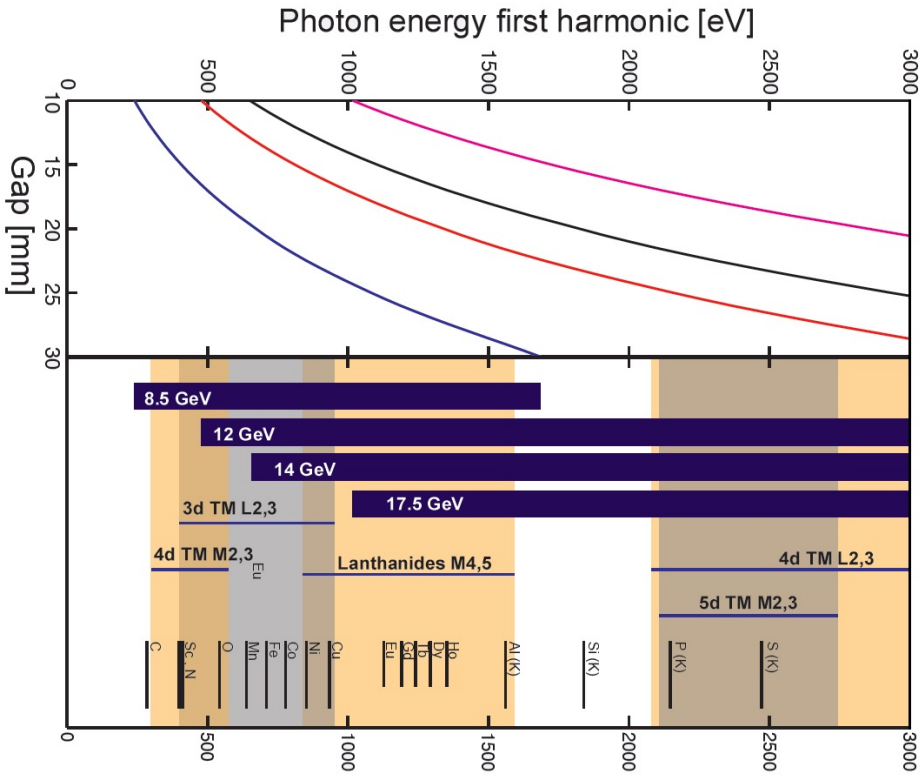
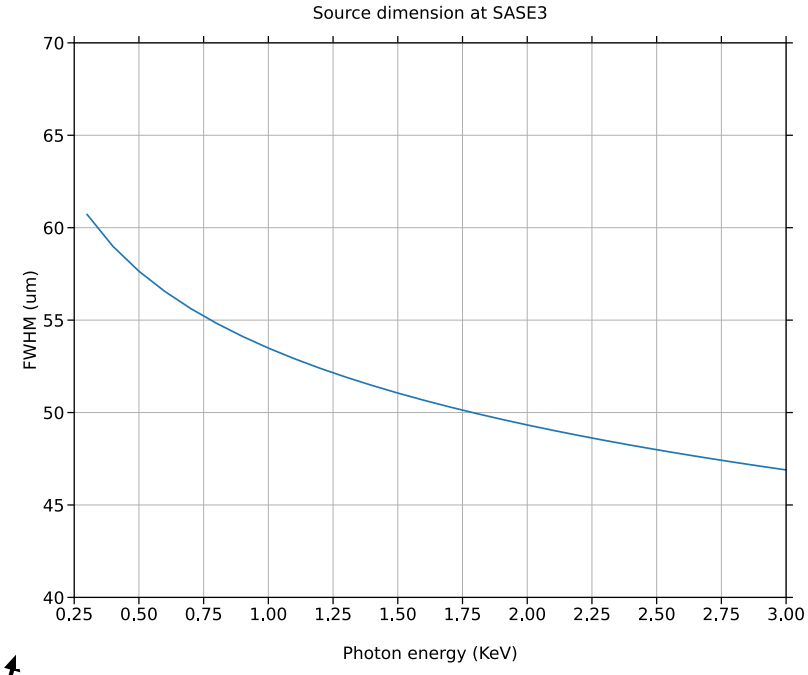
Outline

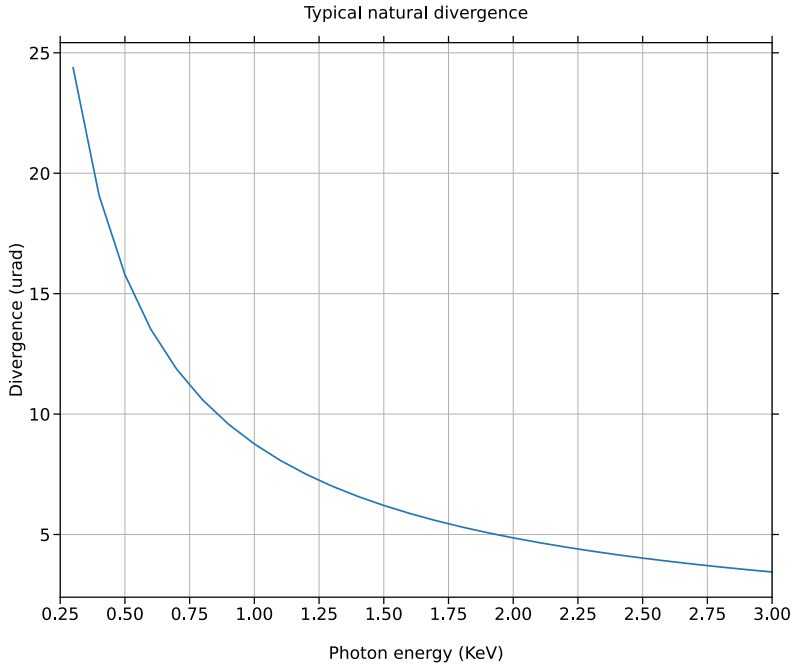
- SASE3 tunnel transport: operation modes
- Radiation protection concept
- Timeline and interface with SXP hutch

SASE3 photon beam properties

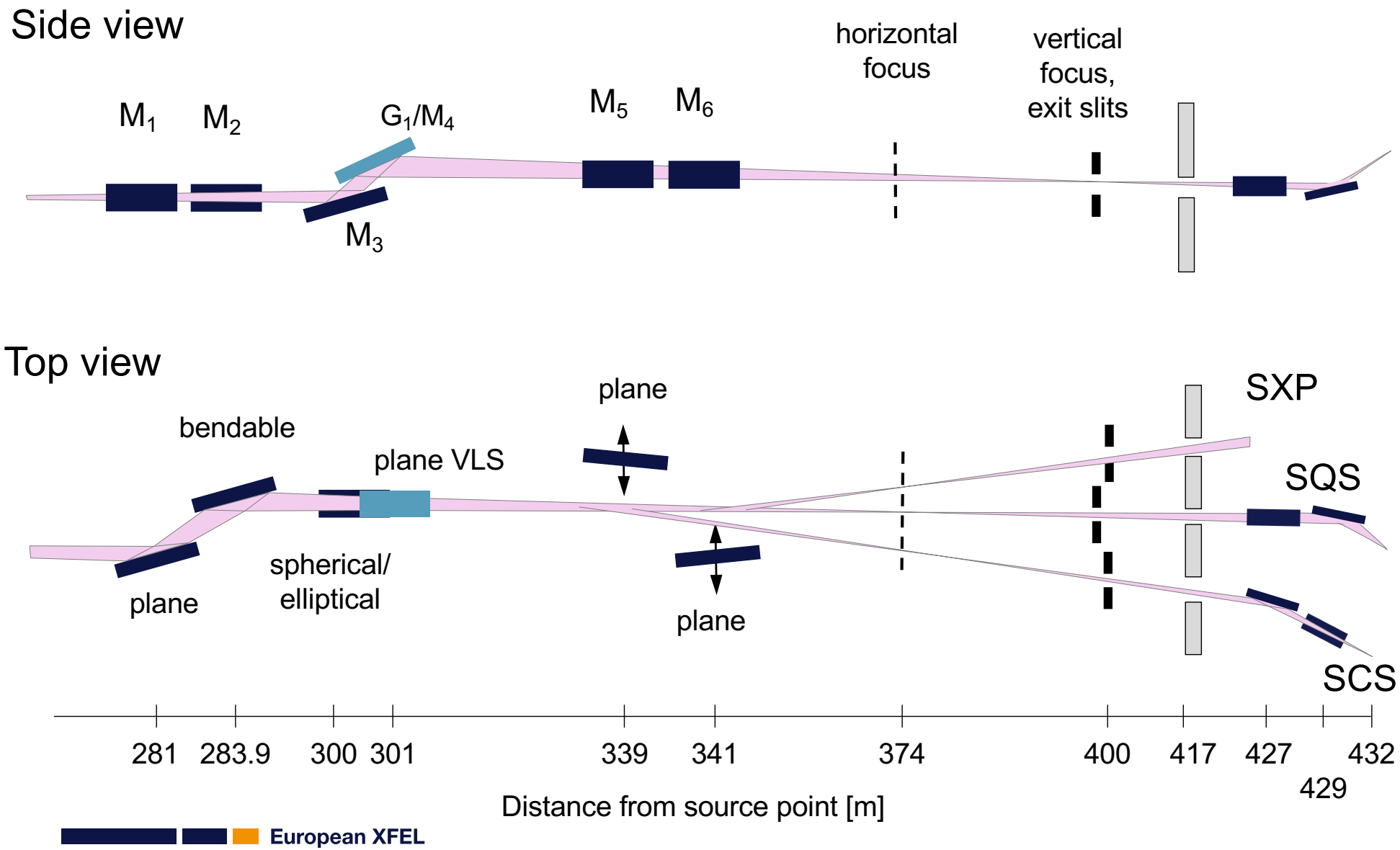


(calculated and used as reference for simulations)

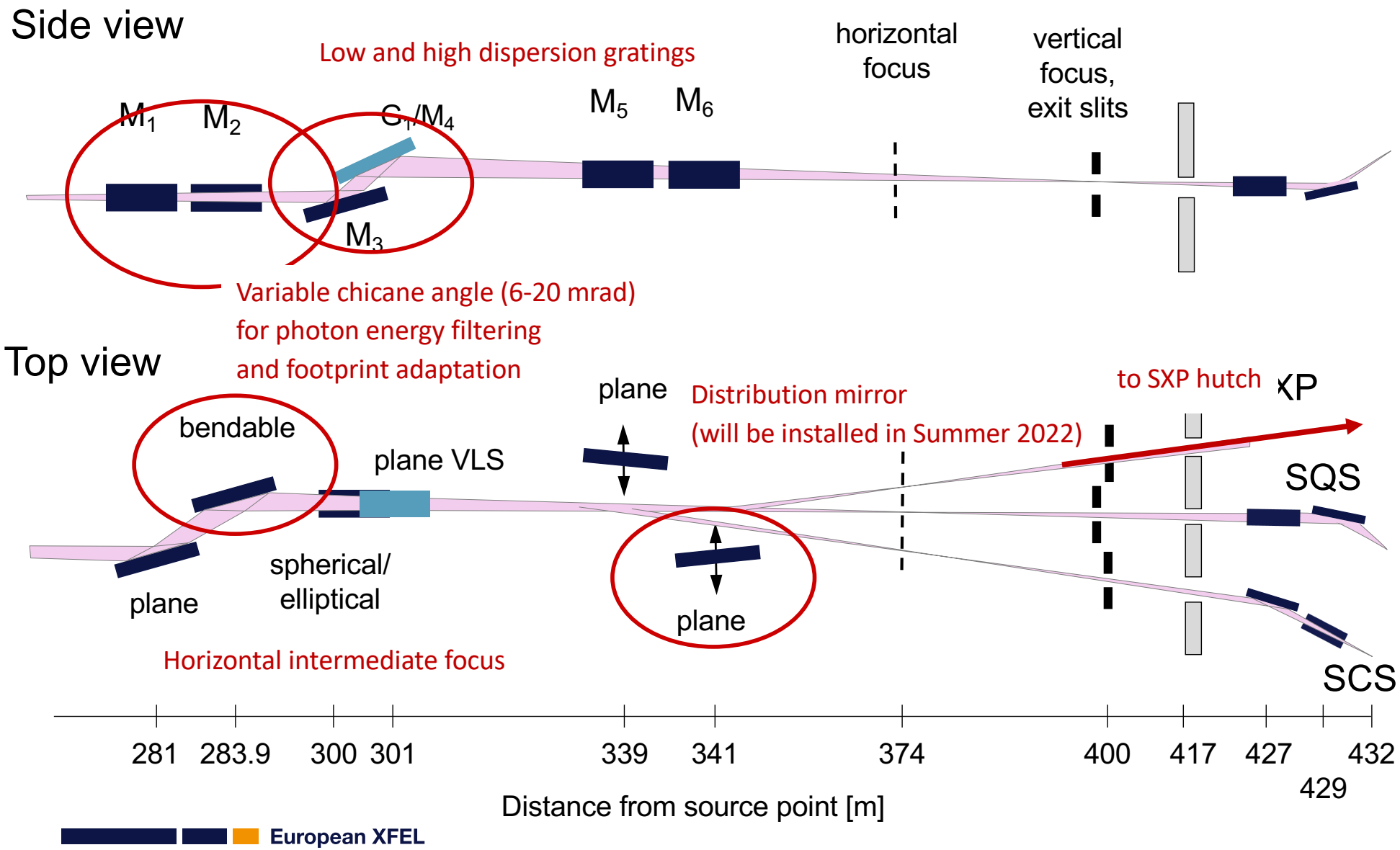




SASE3 optical layout

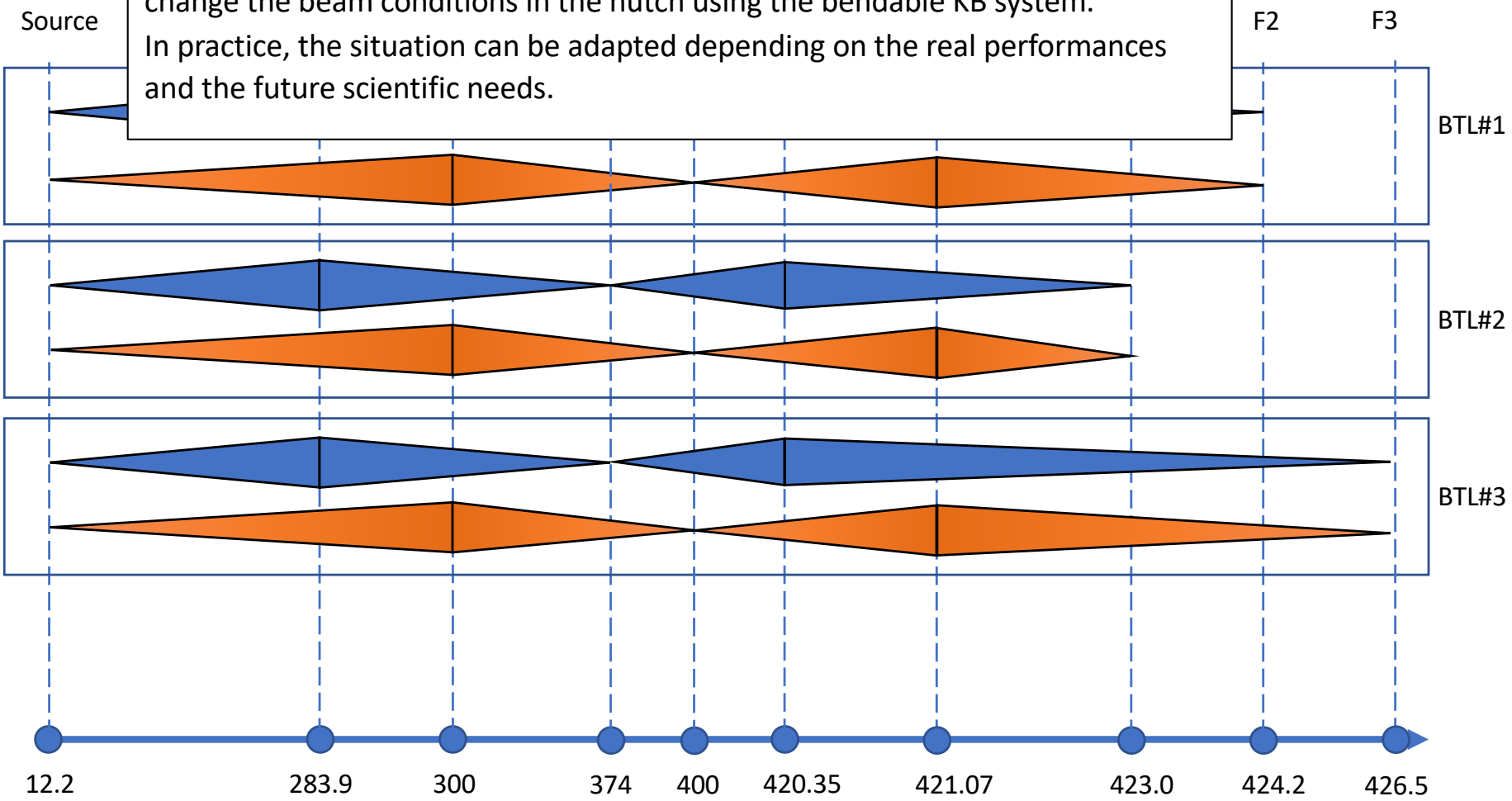


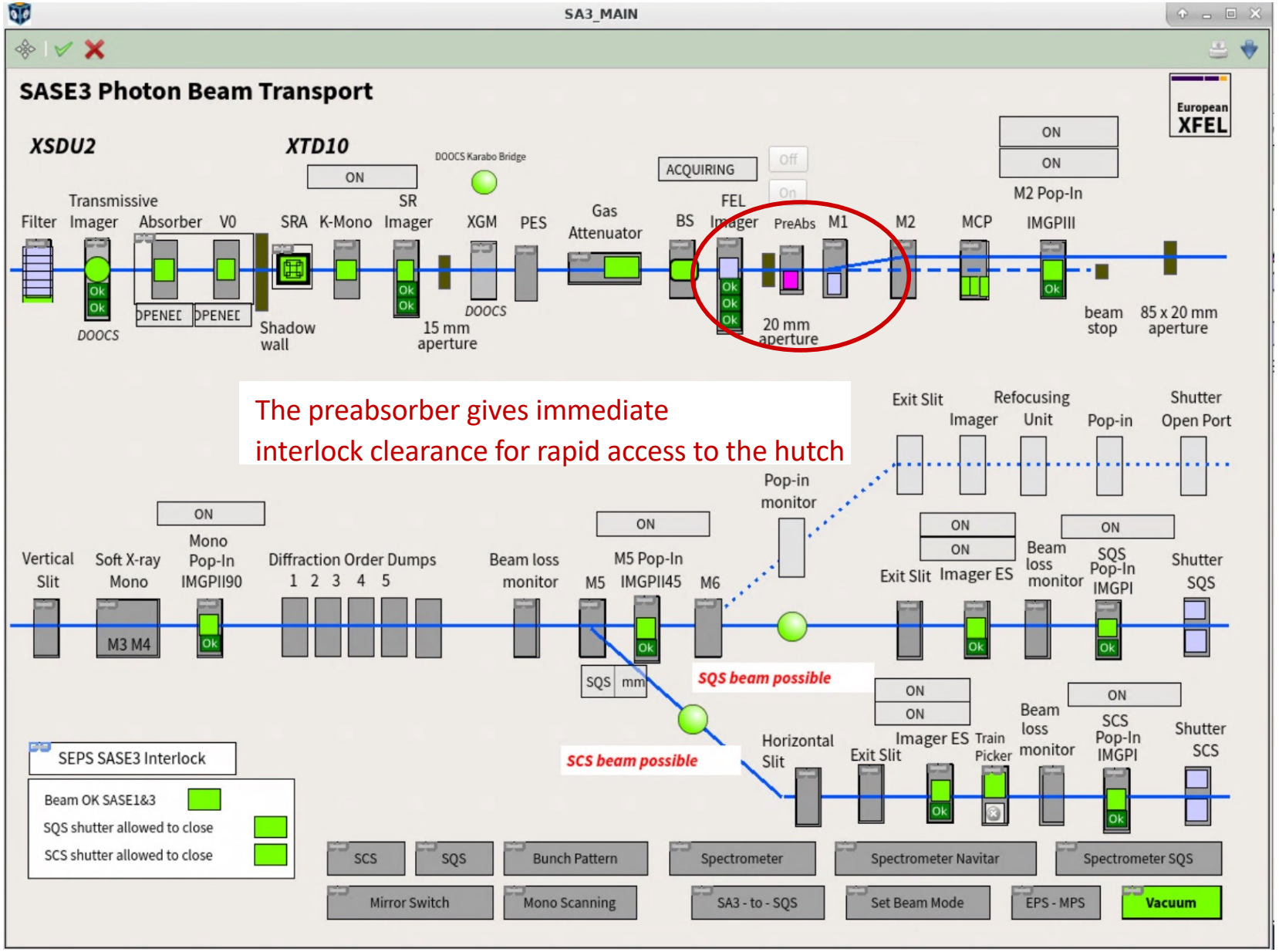
Key concepts



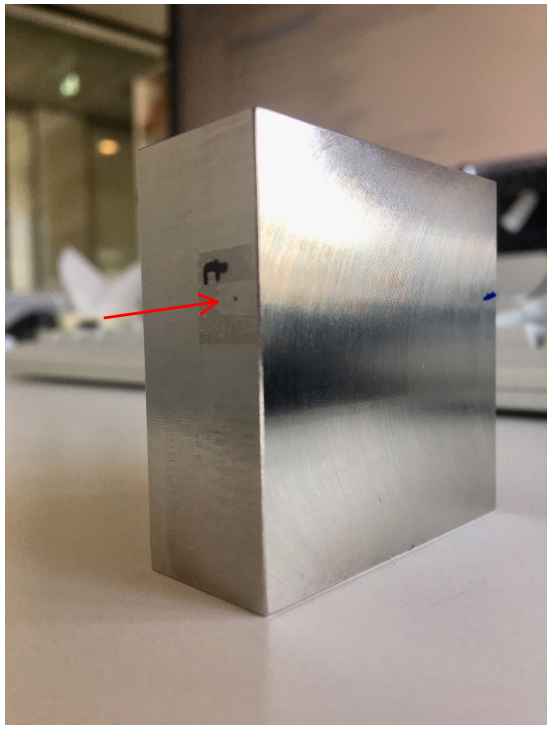
Preferred setups within beam transport

The key concept here is: maintain the beam transport fixed as possible and change the beam conditions in the hutch using the bendable KB system.
In practice, the situation can be adapted depending on the real performances and the future scientific needs.



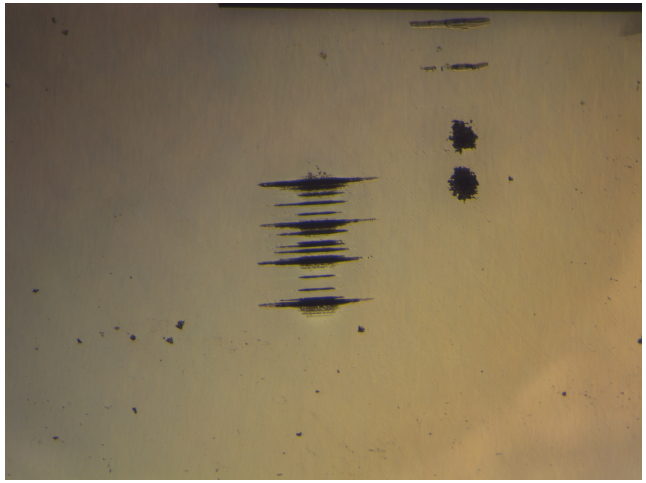

SA3_MAIN
SASE3 Photon Beam Transport
European XFEL
XSDU2
XTD10
ON
DOOCS Karabo Bridge
ACQUIRING
Off
On
ON
ON
M2 Pop-In
Filter
Transmissive Imager
Absorber
V0
SRA
K-Mono
SR Imager
XGM
PES
Gas Attenuator
BS
FEL Imager
PreAbs
M1
M2
MCP
IMGPIII
Ok
OPENED
DOOCS
Shadow wall
15 mm aperture
20 mm aperture
beam stop
85 x 20 mm aperture
The preabsorber gives immediate interlock clearance for rapid access to the hutch
Exit Slit
Imager
Refocusing Unit
Pop-in
Shutter Open Port
Pop-in monitor
Vertical Slit
Soft X-ray Mono
Mono Pop-In IMGPII90
M3 M4
Diffraction Order Dumps
1 2 3 4 5
Beam loss monitor
M5
M5 Pop-In IMGPII45
M6
SQS
mm
SQS beam possible
Exit Slit
Imager ES
Beam loss monitor
SQS Pop-In IMGPI
Shutter SQS
SCS beam possible
Horizontal Slit
Exit Slit
Imager ES
Train Picker
Beam loss monitor
SCS Pop-In IMGPI
Shutter SCS
SEPS SASE3 Interlock
Beam OK SASE1&3
SQS shutter allowed to close
SCS shutter allowed to close
SCS
SQS
Bunch Pattern
Spectrometer
Spectrometer Navitar
Spectrometer SQS
Mirror Switch
Mono Scanning
SA3 - to - SQS
Set Beam Mode
EPS - MPS
Vacuum

Radiation protection

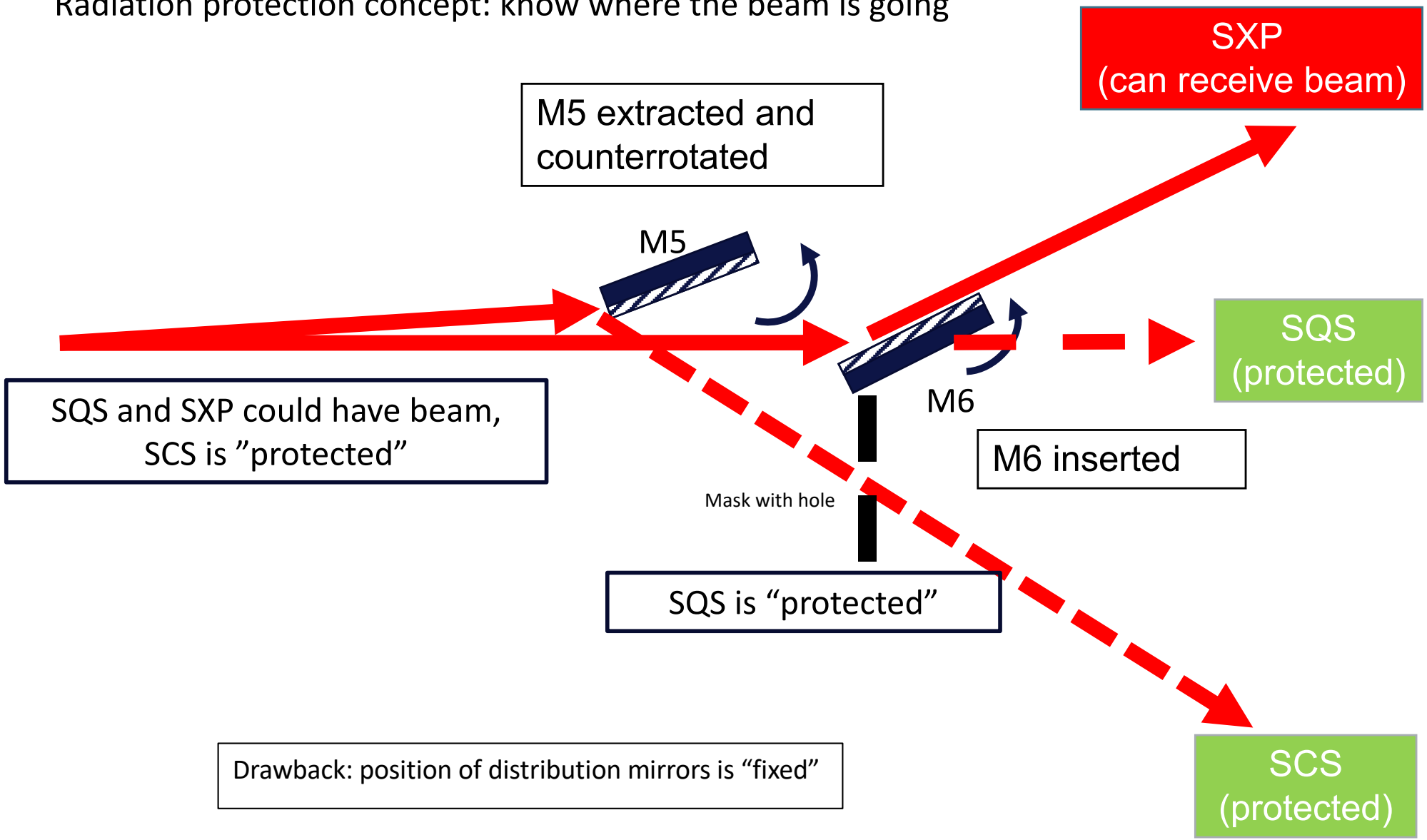


The ability to damage all the kind of materials in some given conditions makes radiation protection job quite hard.

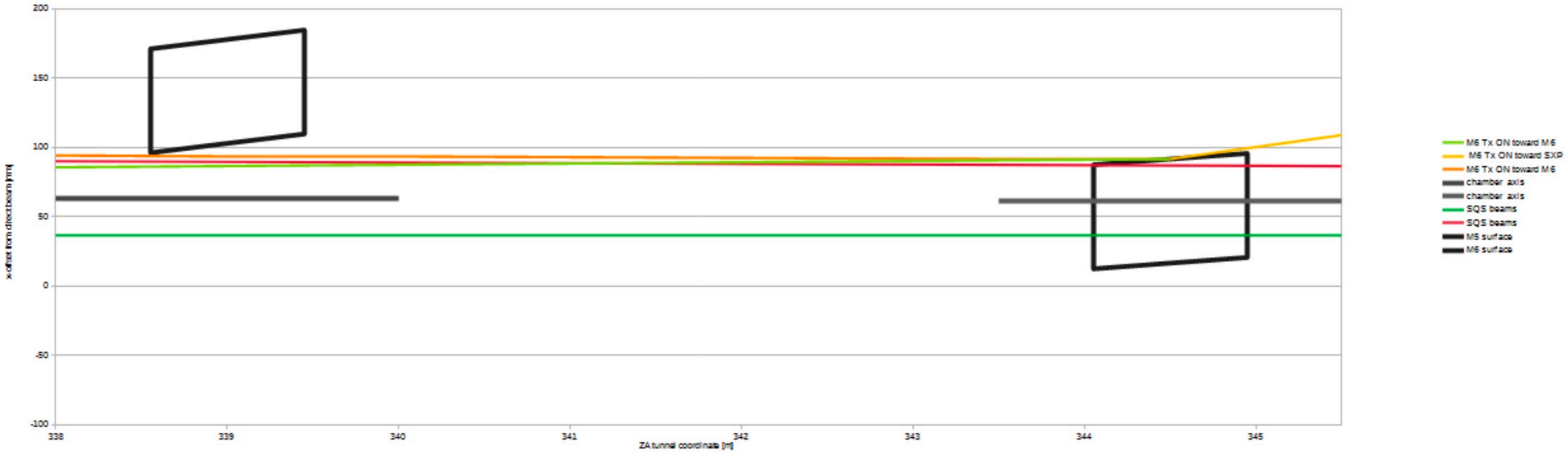
From one hand we are trying to increase the capabilities of our facilities, from the other hand we have to do every step in full safety.



Radiation protection concept: know where the beam is going



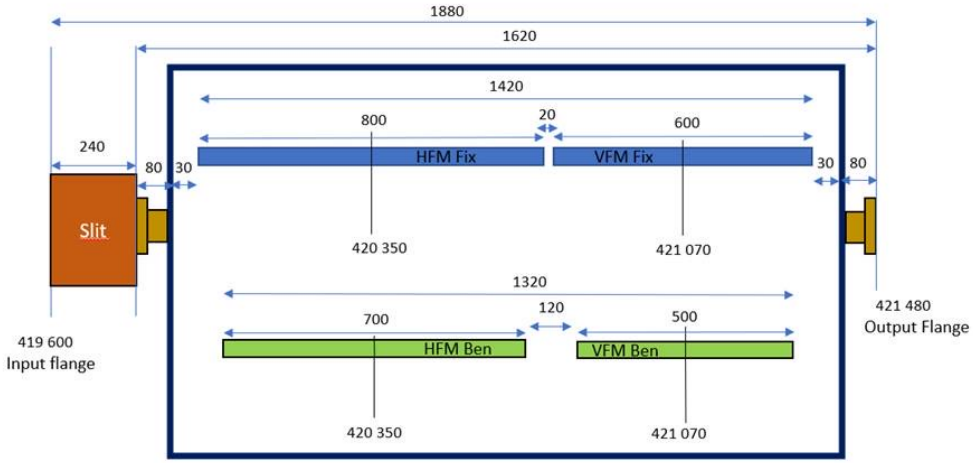
Drawback: position of distribution mirrors is "fixed"

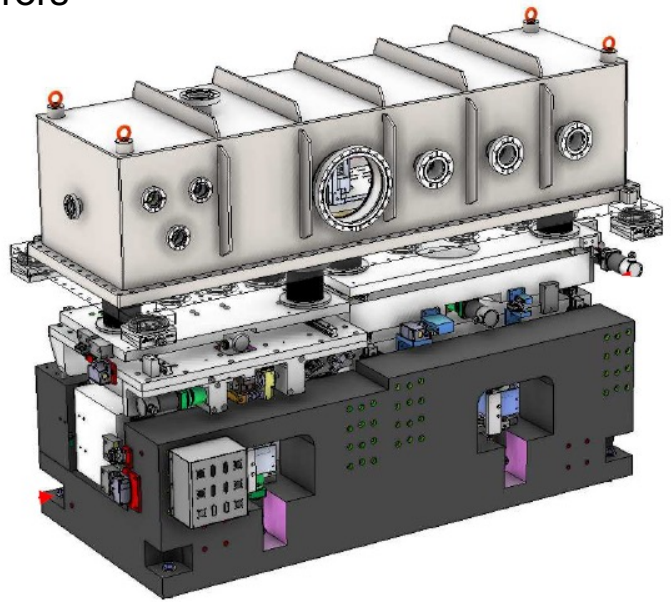


(ray tracing from A. Trapp)

"Actual" time schedule:

- September 2022: beam in SXP hutch. Possible horizontal focusing using the bender M2 (factor of 2 smaller than the source horizontal dimension) but vertically is fixed.
- November 2022: Installation KB chamber and provisional mirrors (fixed radius of 690 m for the horizontal and 415 m for the vertical). Adjustment of angle would provide also focusing conditions.
- Summer shutdown 2023: Installation final bendable mirrors





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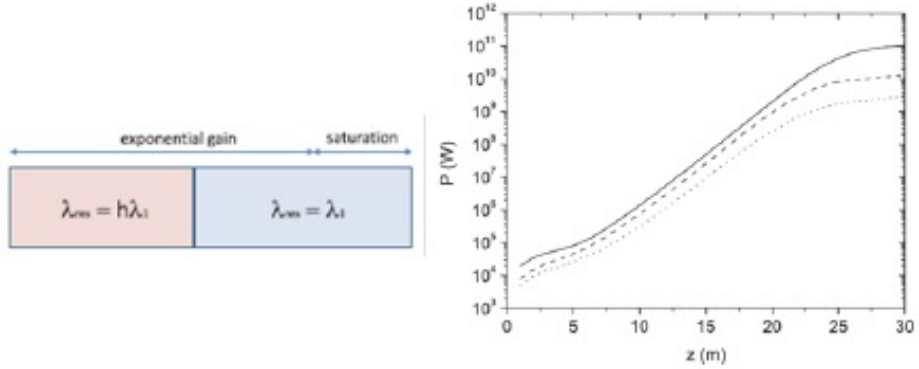
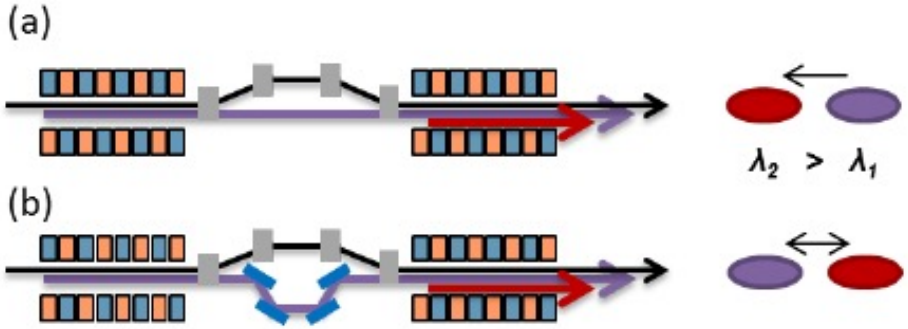
Next projects in SASE3 (available also for SXP)

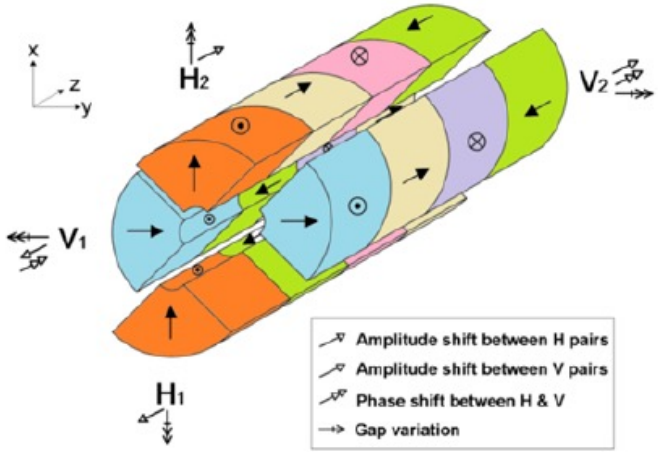
Harmonic Lasing



Two color generation



Variable polarization



Concluding remarks

- SXP Optics transport coming very soon
- Radiation protection concept ready and approved. After hardware implementation, some extended commissioning would be needed
- Beam will be available in SXP hutch in different timelines and with increased possibilities
- Commissioning time would be required. We would examine the possibility to use Machine Development beamtime for further commissioning in 2022 and 2023.

Thank you for your attention !