Wiggler insertion devices at ELETTRA

Permanent magnet Wiggler W14.0 XRD1 source:

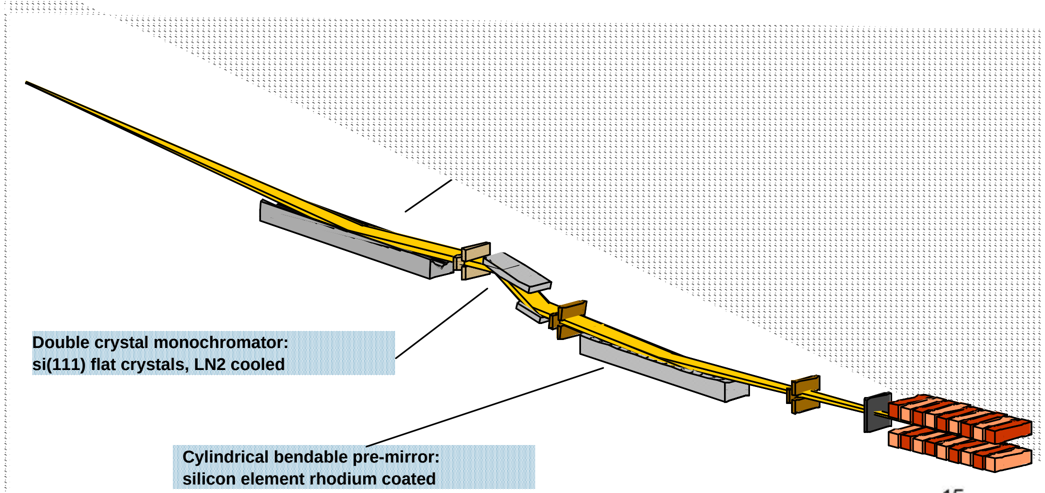
*	B_0	= 1.6 Tesla
*	Period length	= 140 mm
*	No. of poles	= 59
*	Total length	= 4500 mm
*	K_y	= 19.6
*	E_{cm}	= 4.2 Kev (2GeV) / 6.0KeV (2.4GeV)

Multipole Superconducting Wiggler XRD2 source:

*	B_0	= 3.5 Tesla
*	Period length	= 64 mm
*	No. of poles	= 49
*	Total length	= 1568 mm
*	K_y	= 20.9
*	E_{cm}	= 9.2 KeV(2GeV) / 13.2KeV(2.4GeV)

Sincrotrone Trieste S.c.p.A.
Hard-X Ray Optics Laboratory

Diffraction2 conceptual layout



Premirror**:**

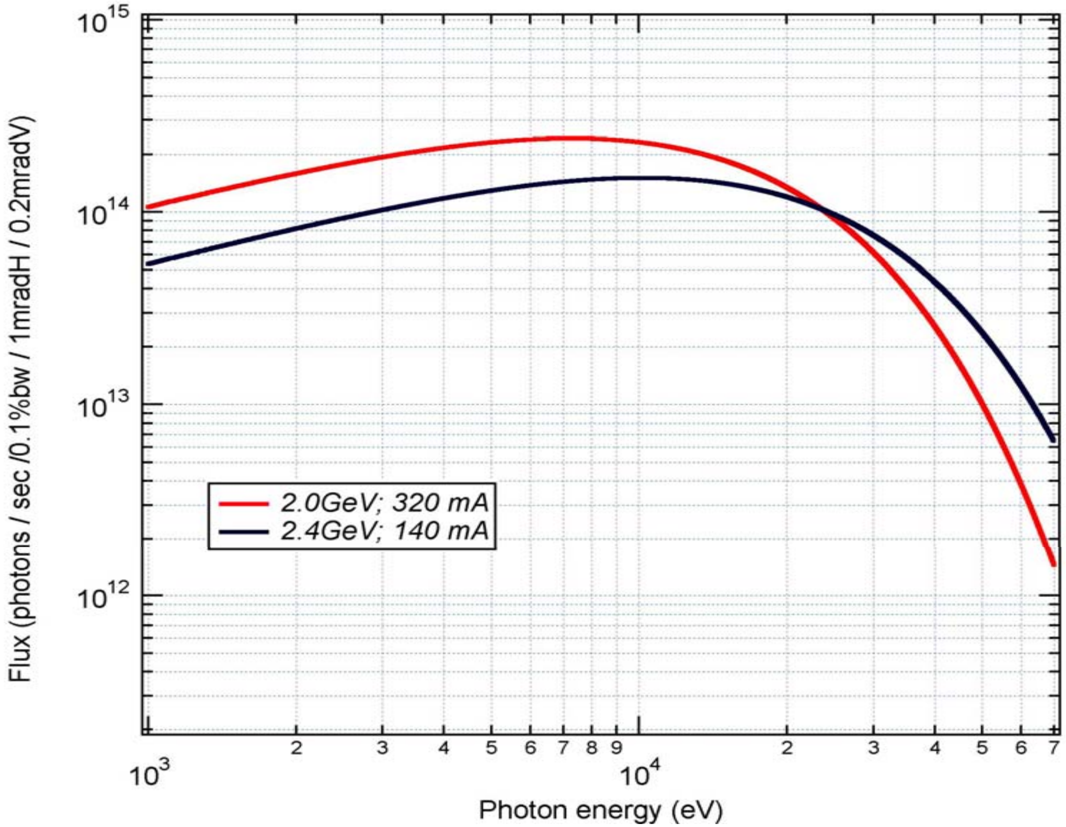
Final shape:	**cylindrical vertical collimator**
Tangential radius:	13.5 Km
Grazing angle:	0.18° (200 μrad vertical)
Source distance:	21139 mm
Active optical surface:	1400 x 45 mm^2

Focalising mirror**:**

Final shape	**toroidal**	
Tangential radius:	6.0 Km	(0.18˚)
Sagittal radius:	49.9 mm	(0.18˚)
Grazing angle:	0.18˚	
Source distance:	26932 mm	
Active optical surface:	1400 x 55 mm^2	
Focal distance:	11000 mm with 0.18˚	
Demagnification:	1.9:1 vertical plane	
	2.4:1 horizontal plane	

Horizontal acceptance: 1mrad max

Vertical acceptance: 200 μrad



Sincrotrone Trieste S.c.p.A.
Hard-X Ray Optics Laboratory

wavelength cutoff [Å]
energy cutoff [keV]
grazing angle[deg]

SCW 2GeV, 320 mA, 1 mradH x 0.2mradV

Incoming power [watt]
absorbed power [watt]
reflected power [watt]

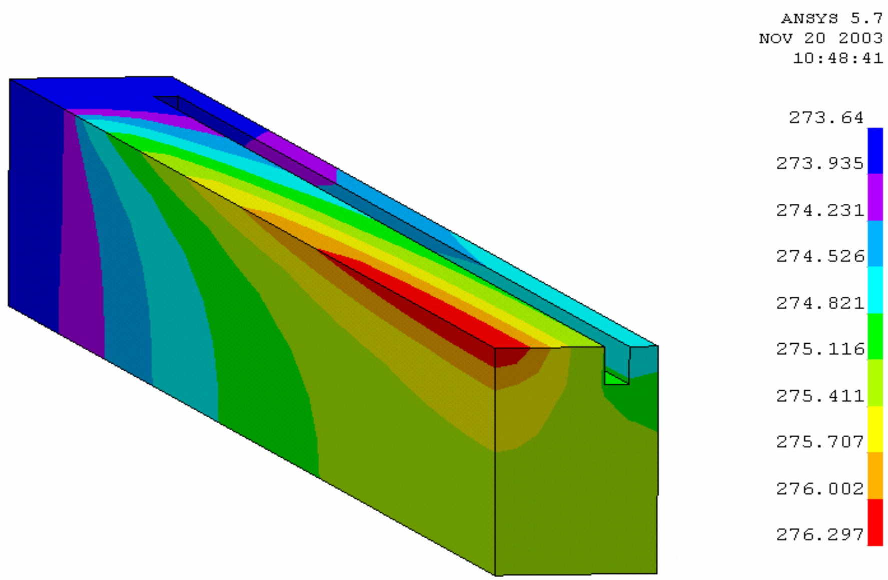
mirror setup

	584	664	748
0.5 □ 24.8KeV 0.1505ū	180 404	185 479	190 557
0.55 □ 22.5KeV 0.167ū	213 371	219 446	225 523
0.6 □ 20.7KeV 0.185ū	250 334	257 407	265 483
0.73 □ 17KeV 0.225ū	329 255	339 325	349 398
	1.5 □ 8.3KeV 900μm	2 □ 6.2KeV 360μm	3 □ 4.1KeV 100μm

wavelength cutoff [Å]
energy cutoff [keV]
thickness [μm]

Graphite filter setup

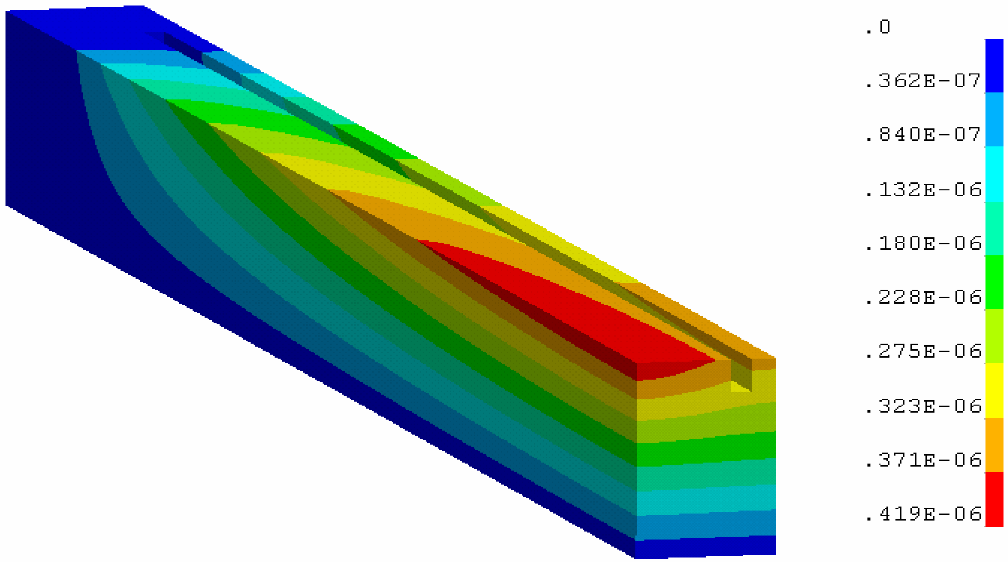
elettra
Sincrotrone Trieste S.c.p.A.
Hard-X Ray Optics
Laboratory



case of C-filter 360μm / 0.185° grazing angle
257 Watt absorbed

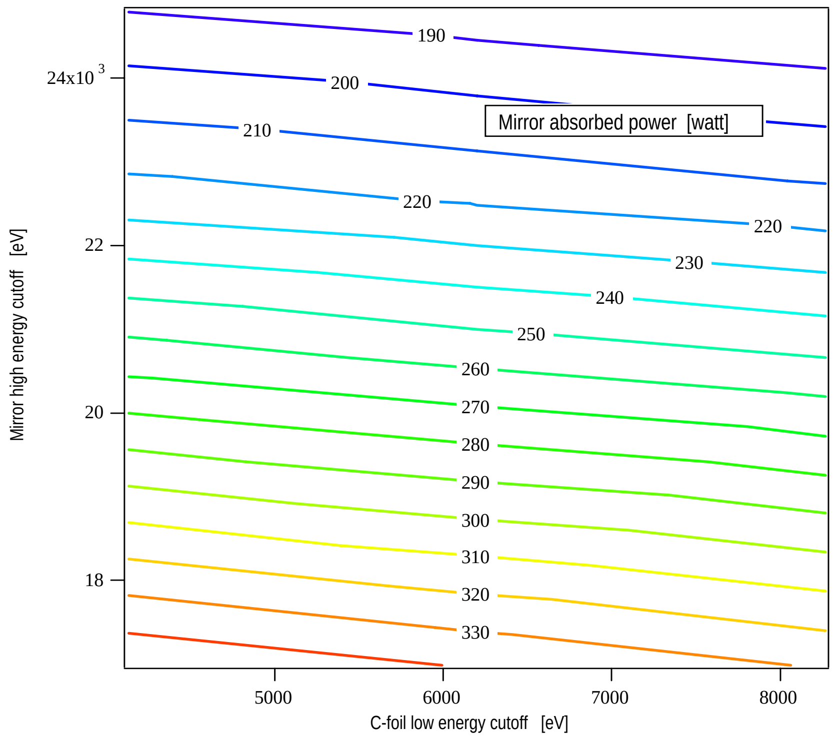
Temperature distribution [K°]

Mirror deformation [m]
The coolant is water at 293K°
and the flow is 300 l/h



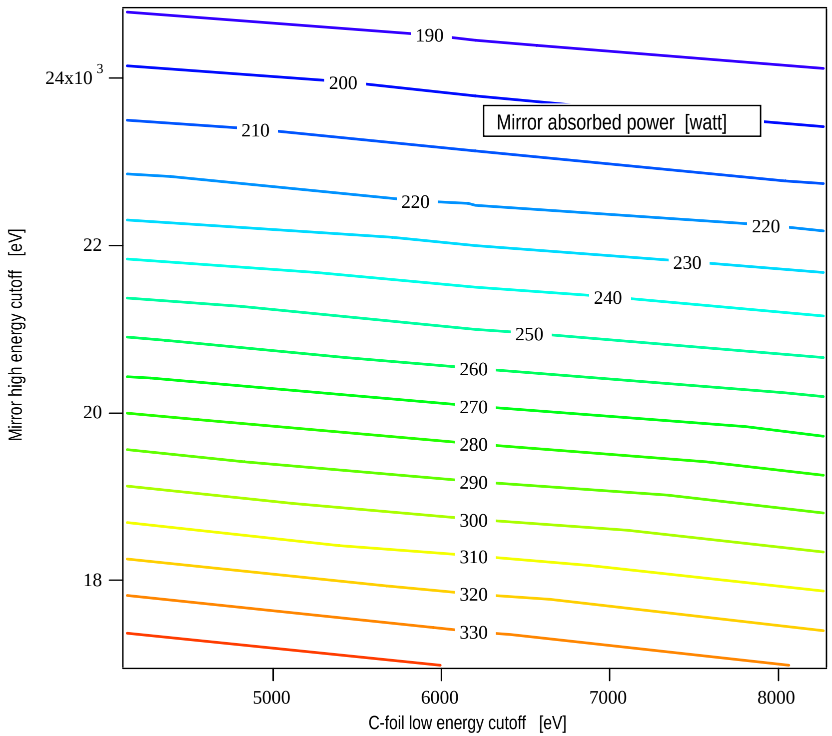
elettra
Sincrotrone Trieste S.c.p.A.
Hard-X Ray Optics
Laboratory

SCW 2GeV, 320 mA, 1 mradH x 0.2mradV

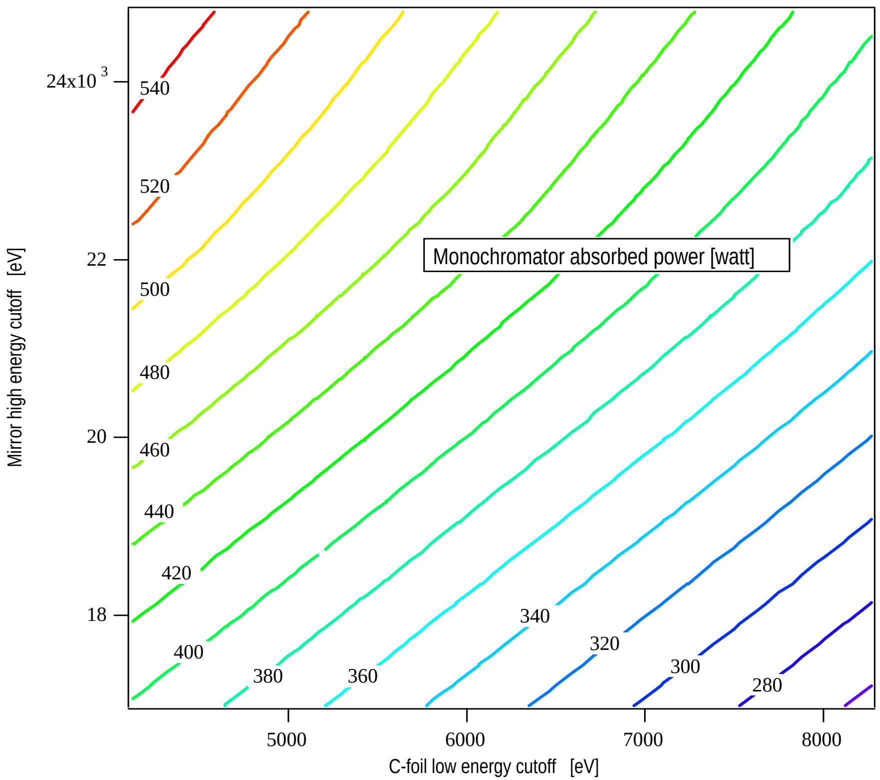


because of the reflectivity the
the mirror absorbed power depends
on the low-pass filter threshold mostly

Sincrotrone Trieste S.c.p.A.
Hard-X Ray Optics
Laboratory



SCW 2GeV, 320 mA, 1 mradH x 0.2mradV

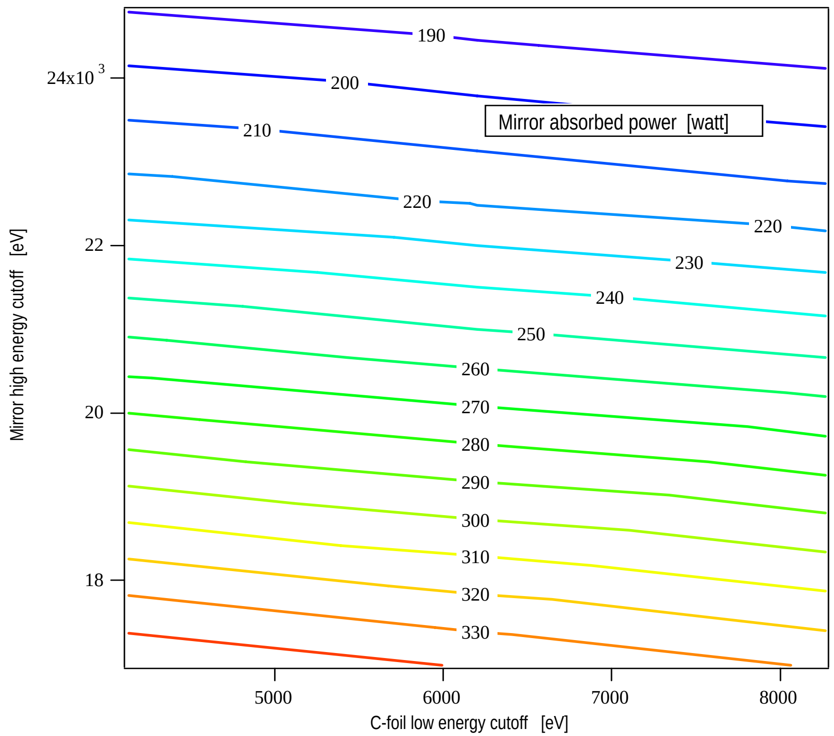


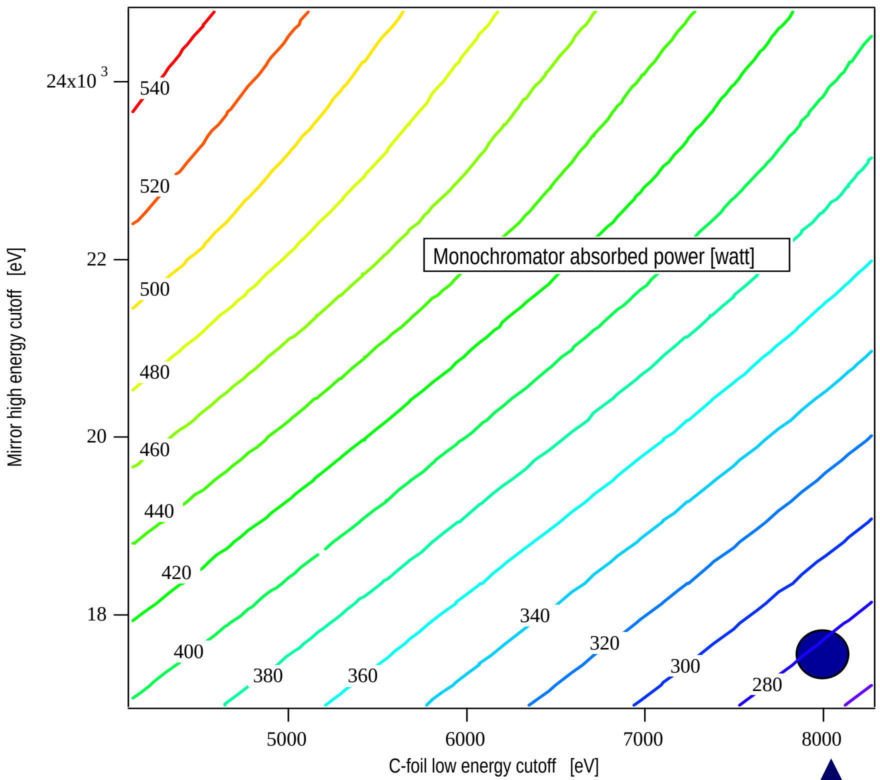
because of the reflectivity the
the mirror absorbed power depends
on the low-pass filter threshold mostly

the high-pass filter threshold now has a
not negligible contribution

elettra
Sincrotrone Trieste S.c.p.A.
Hard-X Ray Optics
Laboratory

SCW 2GeV, 320 mA, 1 mradH x 0.2mradV



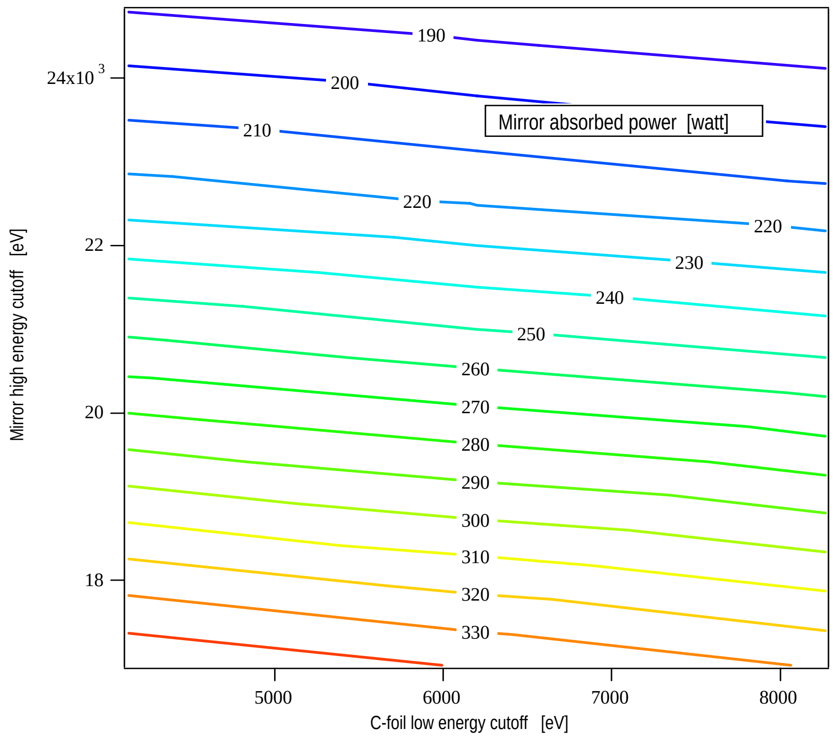


because of the reflectivity the
the mirror absorbed power depends
on the low-pass filter threshold mostly

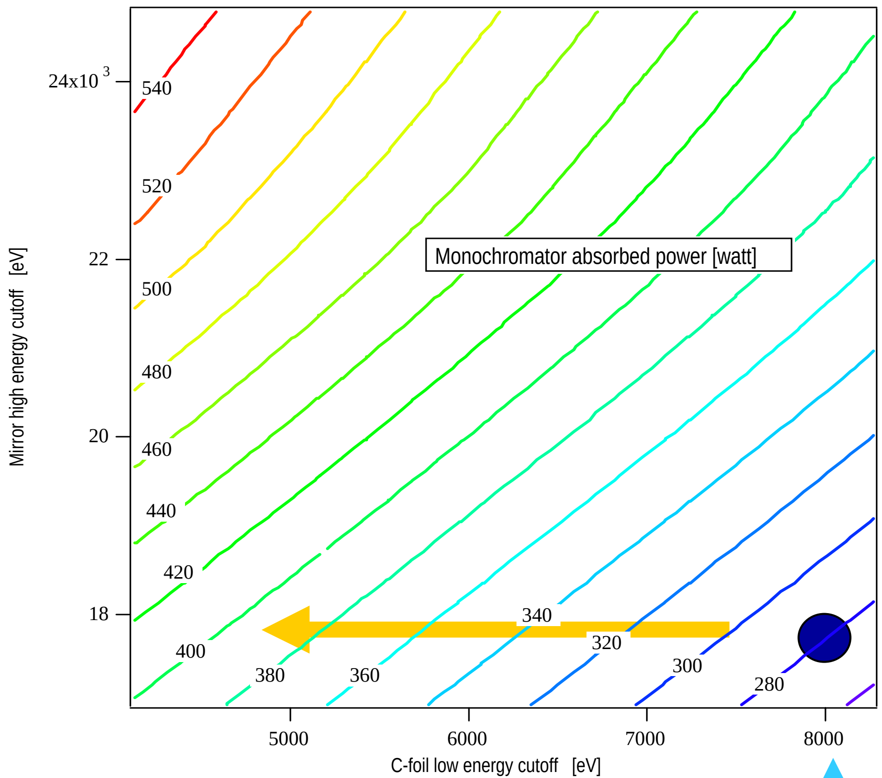
the high-pass filter threshold now has a
not negligible contribution

first step: ***H_2O as coolant is still almost ok***

elettra
Sincrotrone Trieste S.c.p.A.
Hard-X Ray Optics
Laboratory



SCW 2GeV, 320 mA, 1 mradH x 0.2mradV



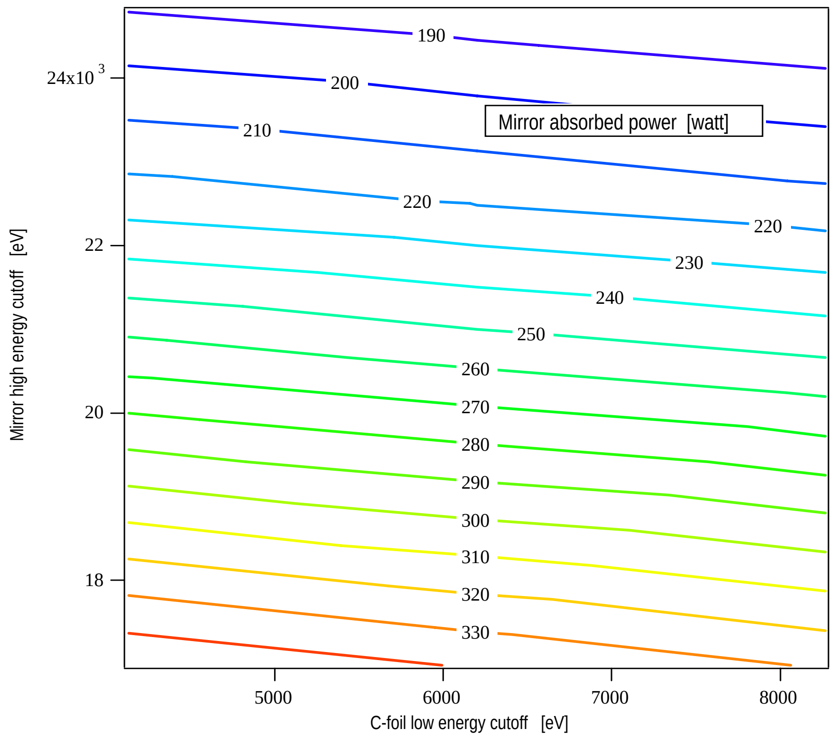
because of the reflectivity the the mirror absorbed power depends on the low-pass filter threshold mostly

the high-pass filter threshold now has a not negligible contribution

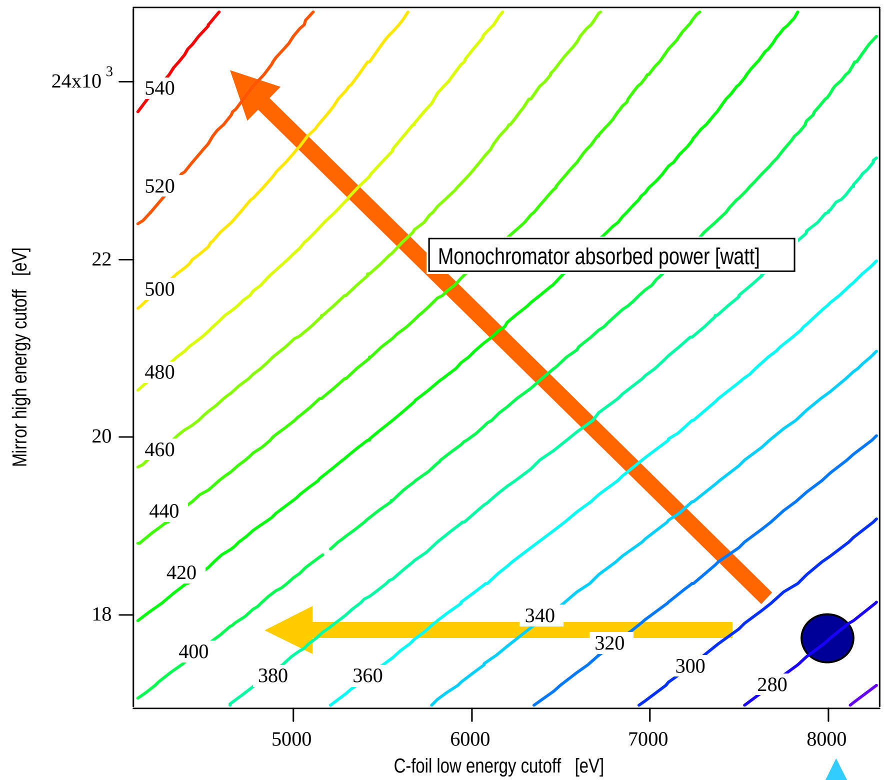
first step: H_2O as coolant is still almost ok

in a second time: extend the range in the low energy direction

elettra
Sincrotrone Trieste S.c.p.A.
Hard-X Ray Optics Laboratory



SCW 2GeV, 320 mA, 1 mradH x 0.2mradV



because of the reflectivity the
the mirror absorbed power depends
on the low-pass filter threshold mostly

the high-pass filter threshold now has a
not negligible contribution

first step: *H_2O as coolant is still almost ok*

in a second time: extend the range in the low energy direction
or, if requested, open the energy window.....both with LN2 as coolant

elettra
Sincrotrone Trieste S.c.p.A.
Hard-X Ray Optics
Laboratory