P61 BEAMLINE

31-01-2018

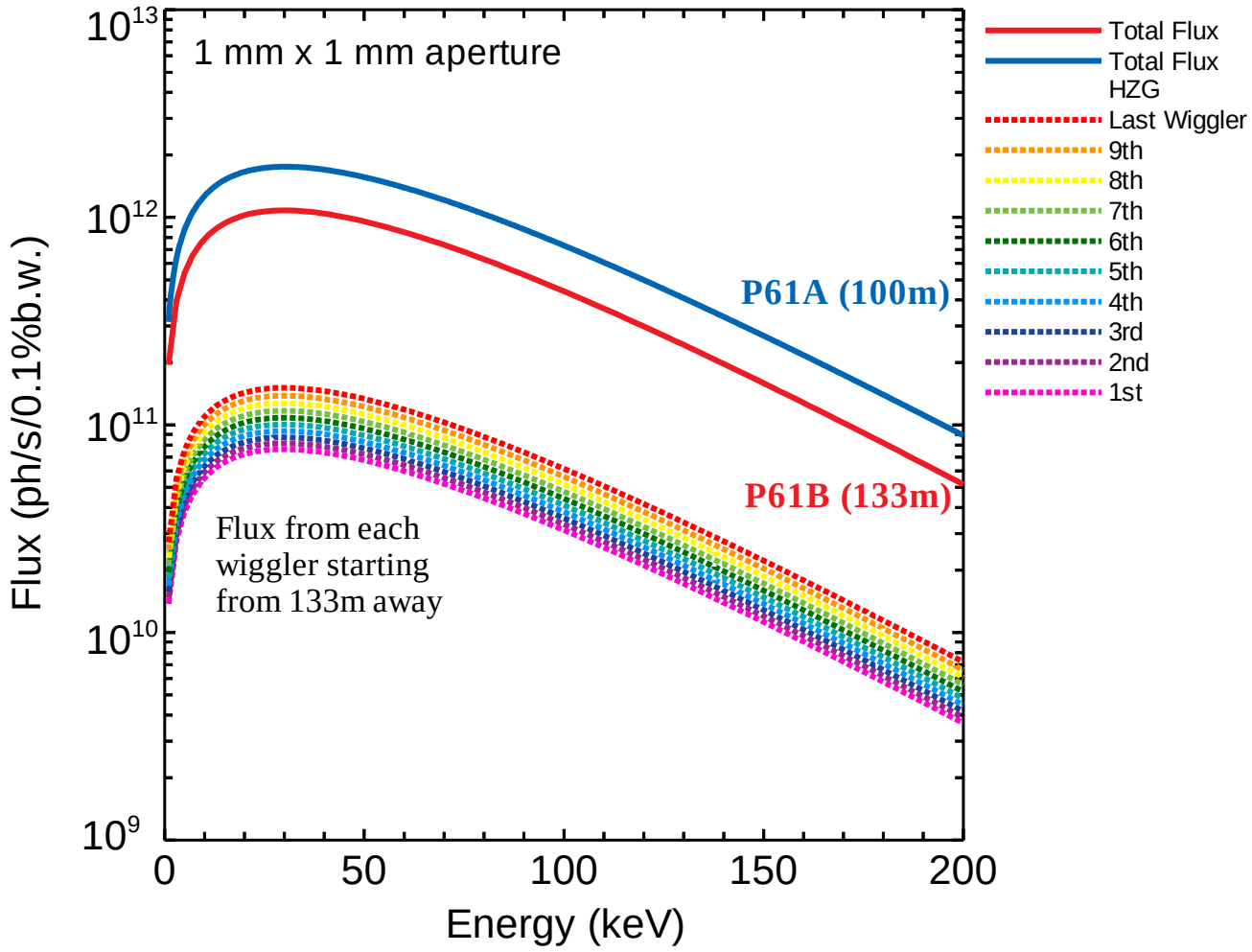
Calculations of beamline characteristics

Version 2.3

P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

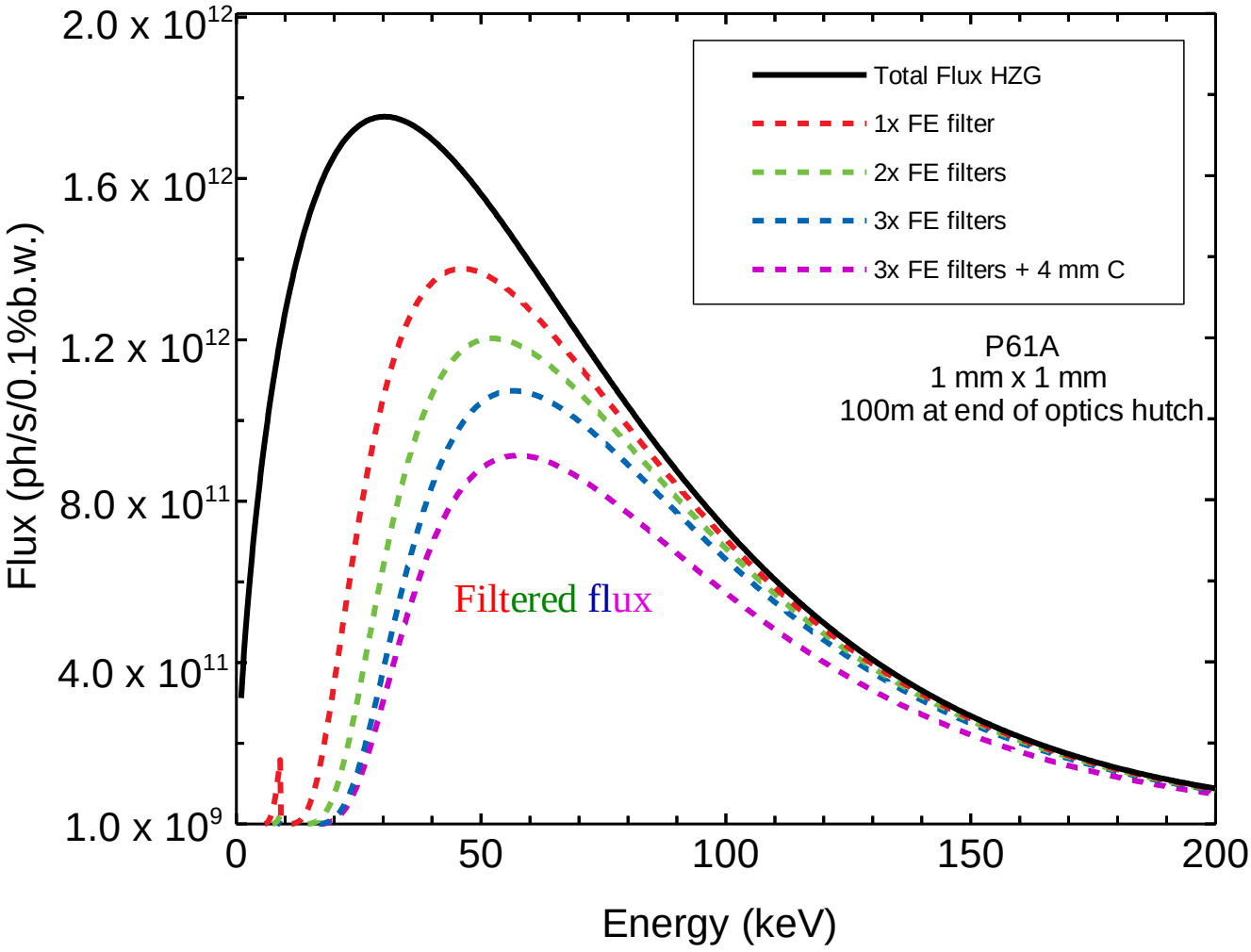
PHOTON FLUX FROM 10 WIGGLERS FOR P61



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

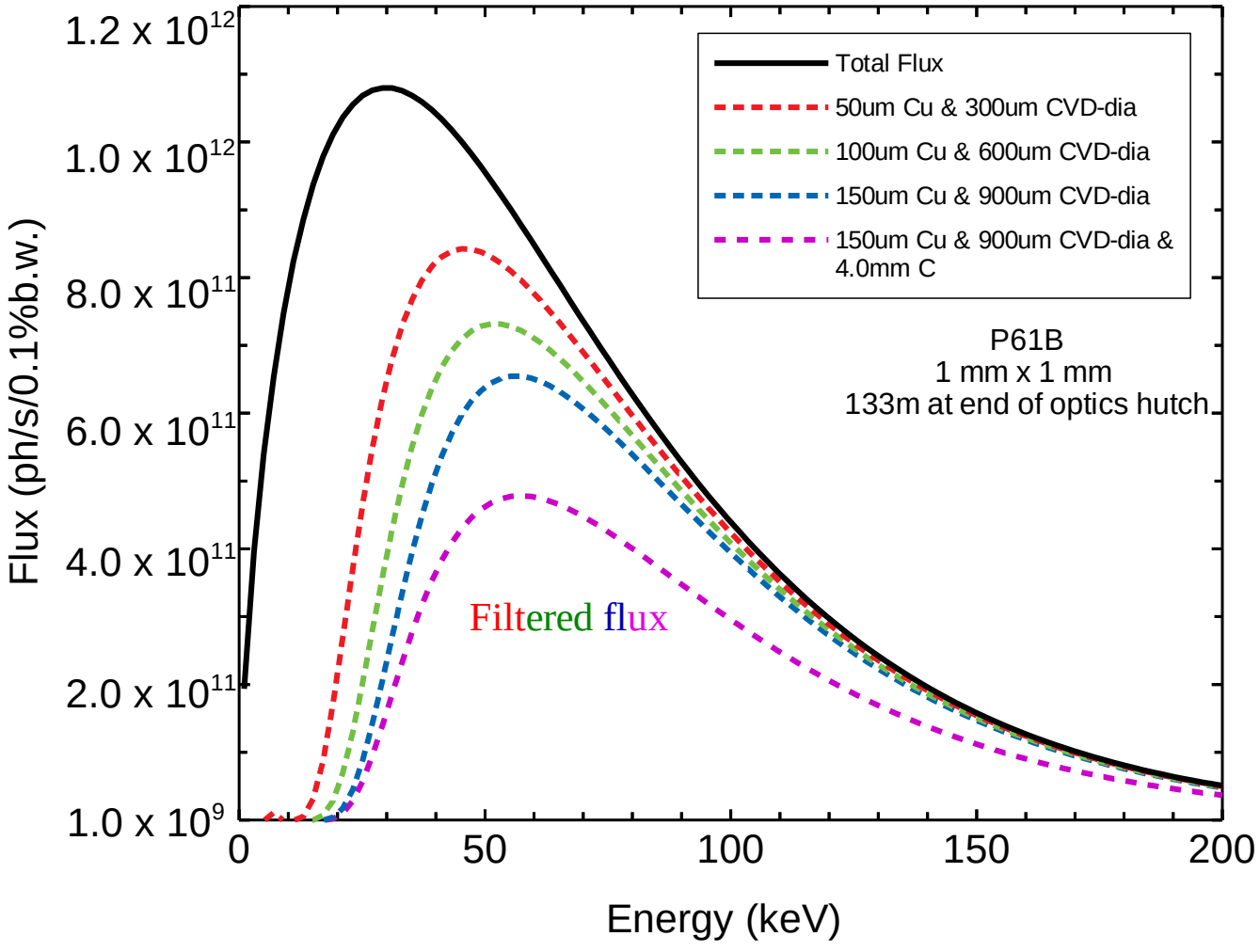
FILTERED FLUX FOR P61A



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

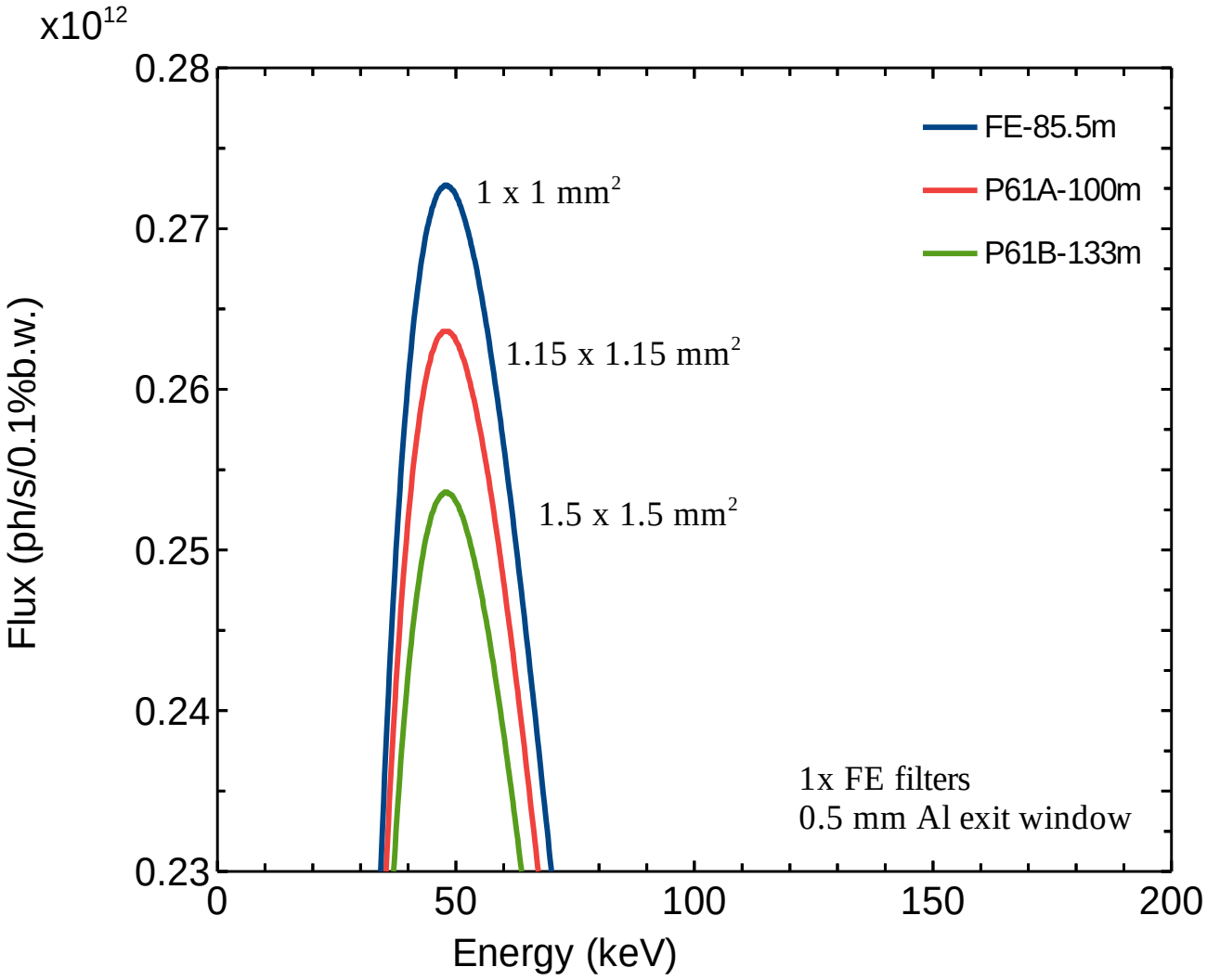
FILTERED FLUX FOR P61B



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

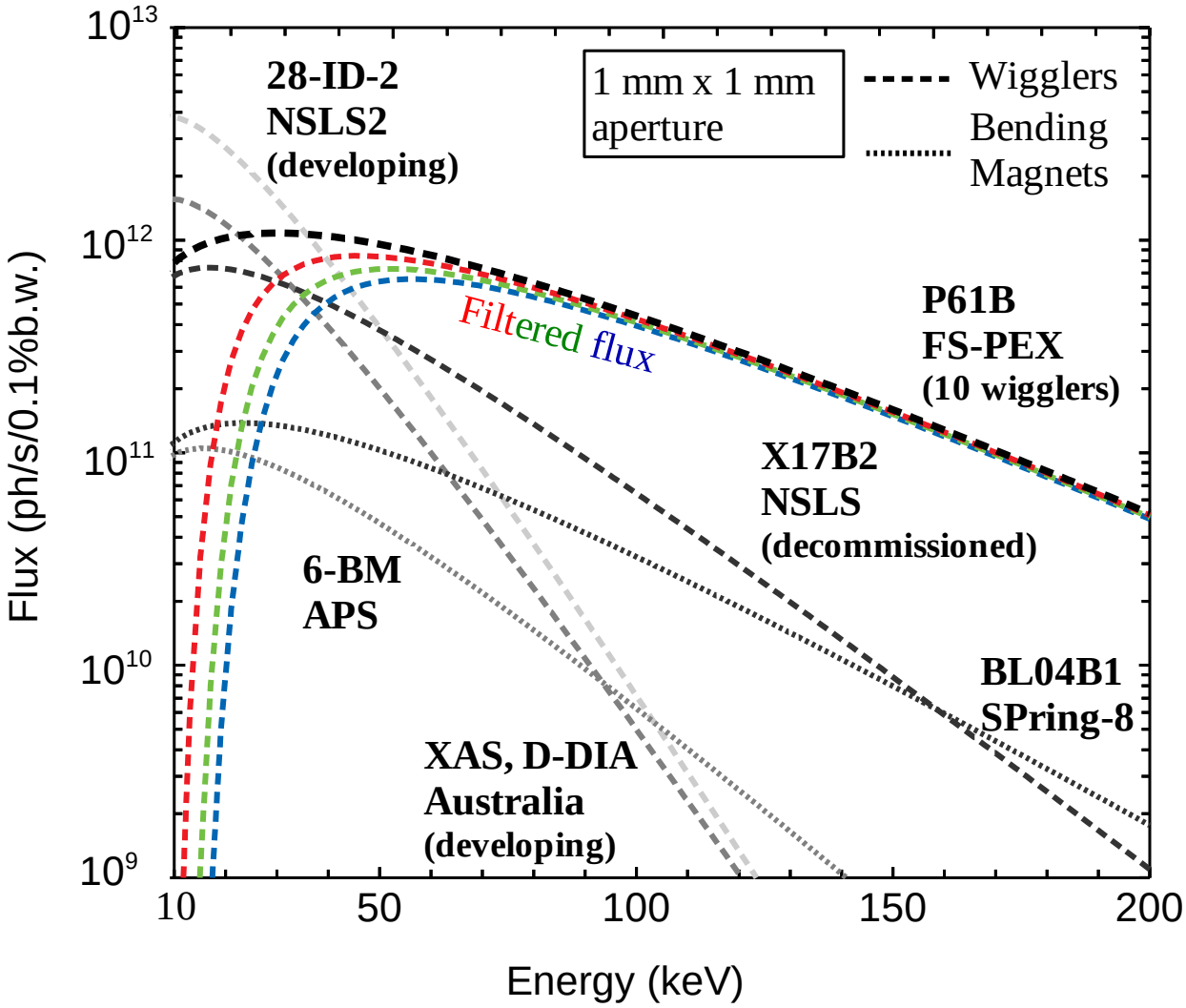
BEAM SIZE ESTIMATION BY FLUX COMPARISON



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

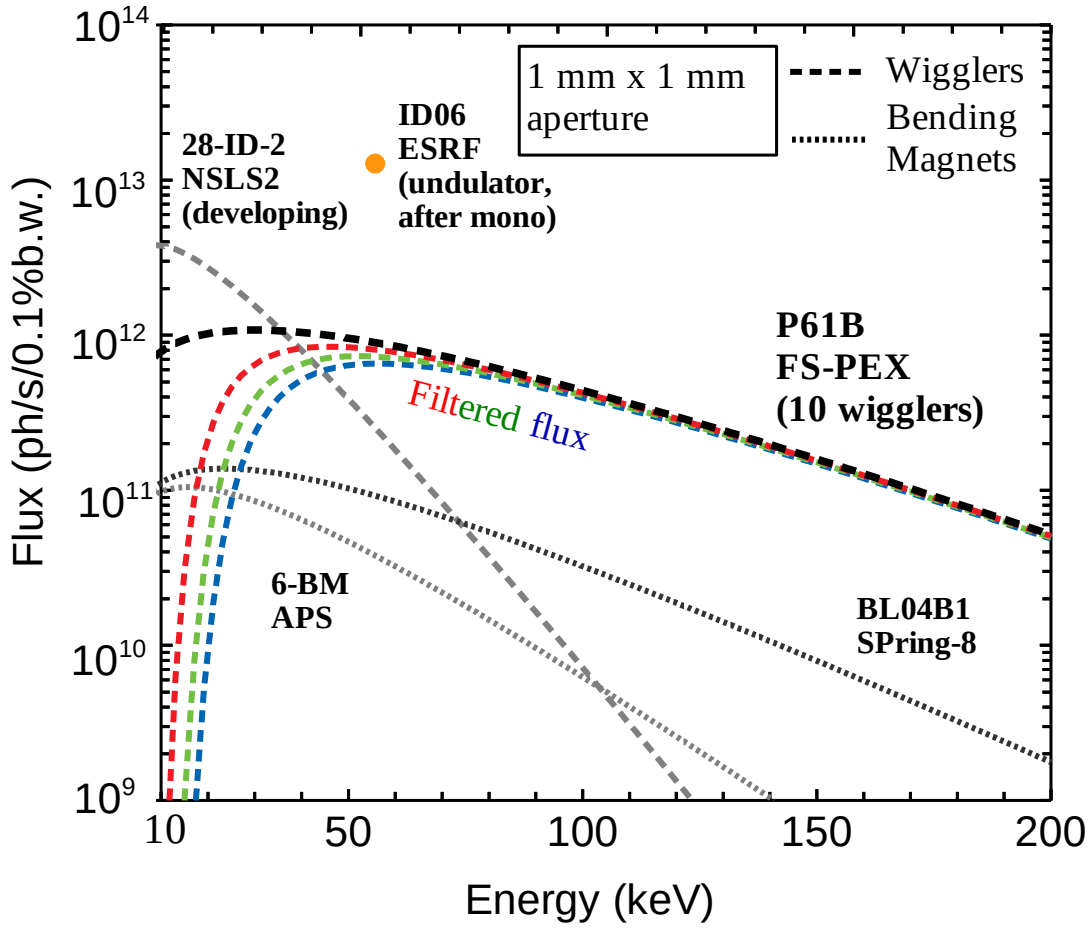
COMPARISON OF FLUX WITH OTHER WIGGLER AND BENDING MAGNET HIGH-PRESSURE BEAMLINES



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

COMPARISON OF FLUX WITH EXISTING HIGH-PRESSURE BEAMLINES, INCLUDING ID06 AT ESRF

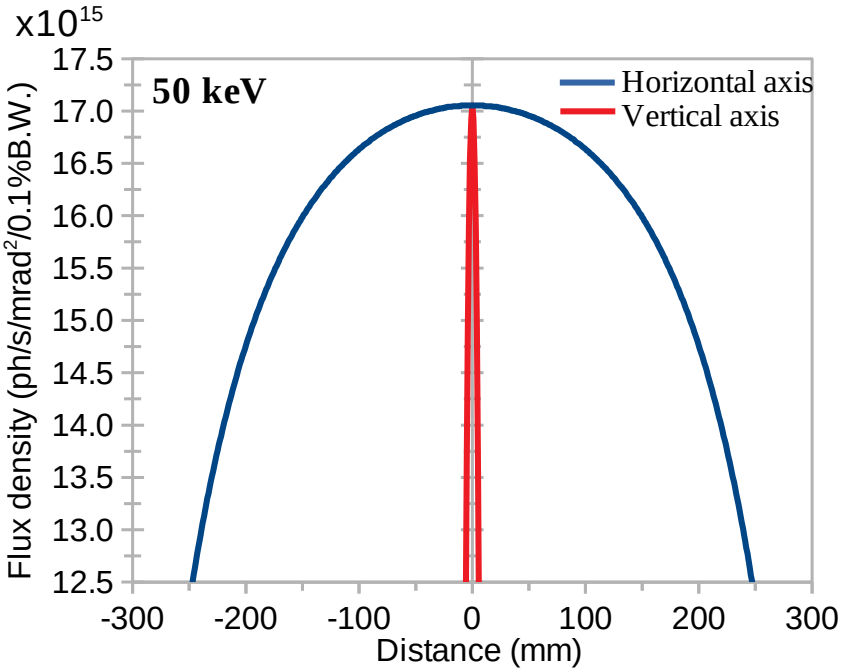


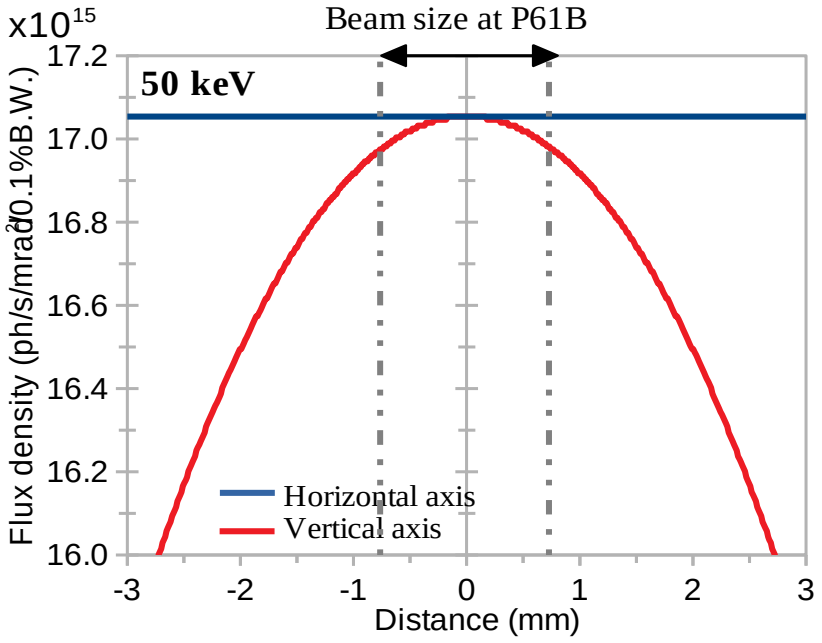
NATURALLY, UNDULATOR FLUX AT ESRF IS VERY HIGH, EVEN AFTER A MONOCHROMATOR (FACTOR X10 LESS). HOWEVER, ONLY AD-XRD IS POSSIBLE AT FIXED ENERGY, SO SOME STUDIES ON AMORPHOUS, LIQUID AND LOW-Z MATERIALS WOULD BE CHALLENGING.

P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

FLUX DENSITY PROFILES FOR PEAK FLUX AT 50 KEV

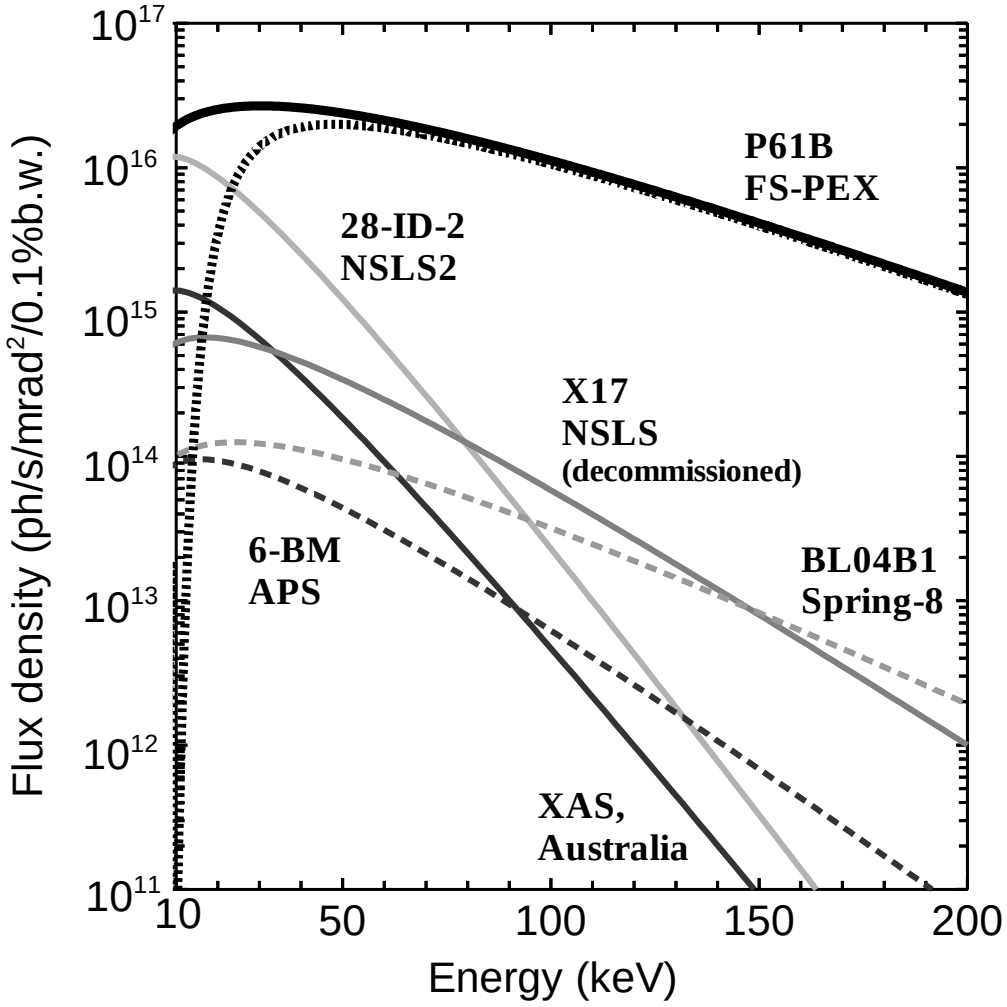




P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

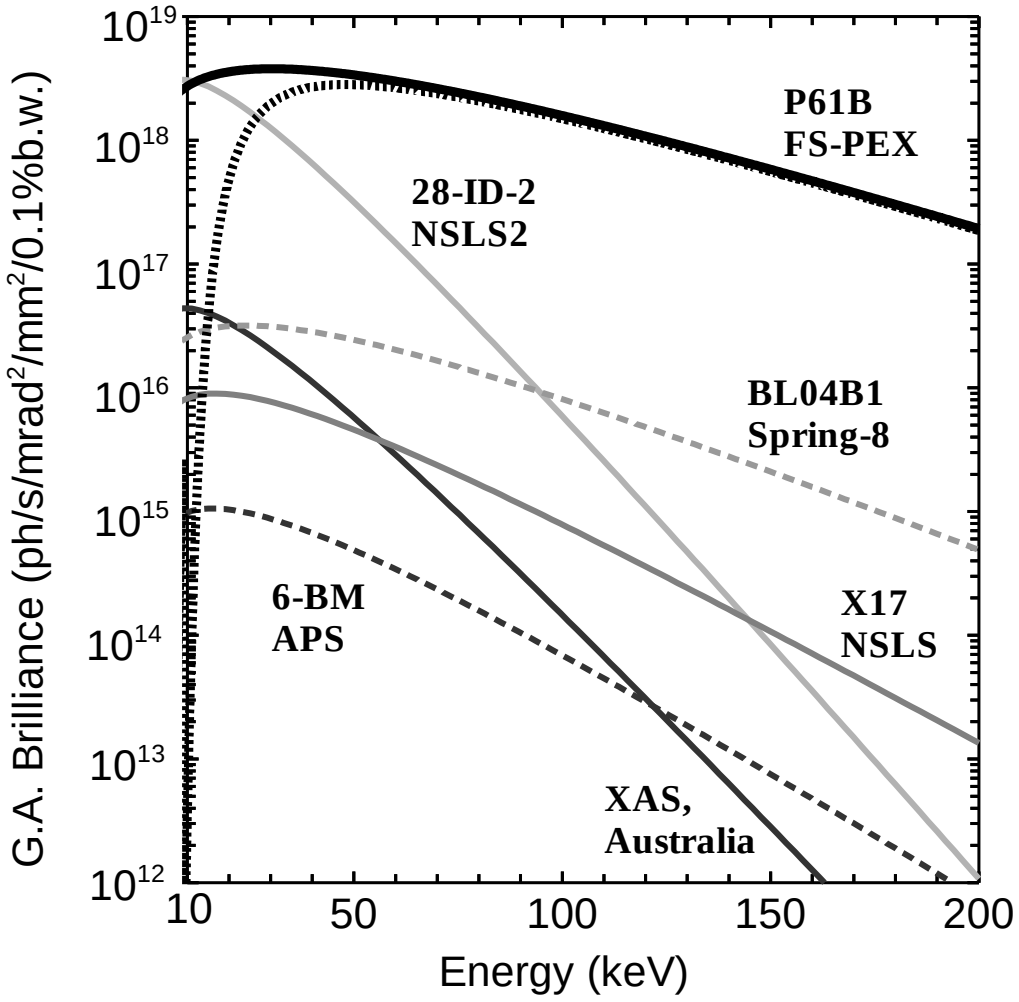
COMPARISON OF FLUX DENSITY WITH OTHER WIGGLER AND BENDING MAGNET BEAMLINES



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

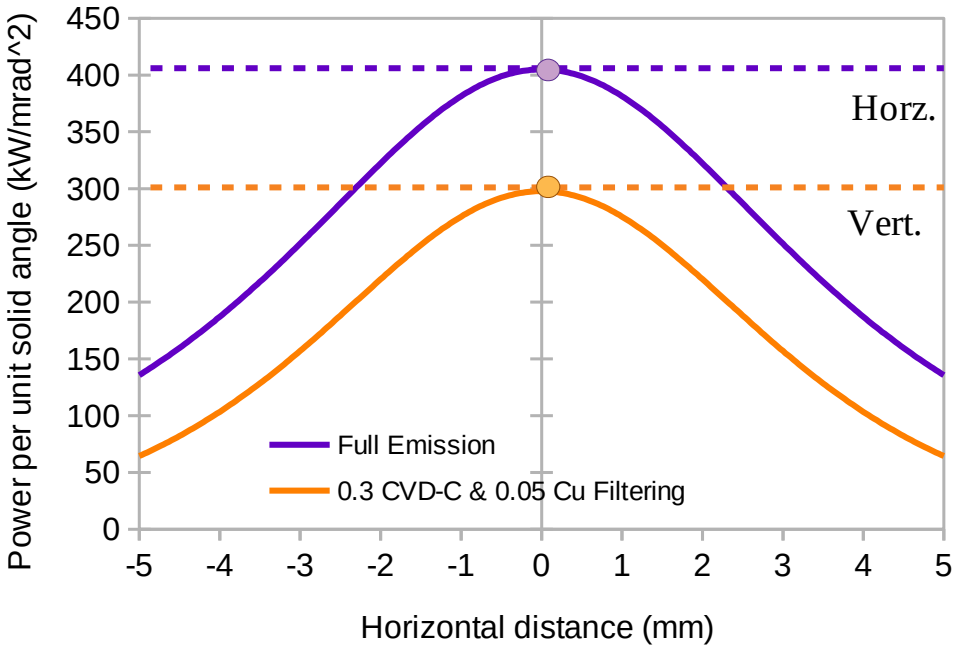
COMPARISON OF GAUSSIAN APPROXIMATED (G.A.) BRILLIANCE WITH OTHER WIGGLER AND BENDING MAGNET BEAMLINES

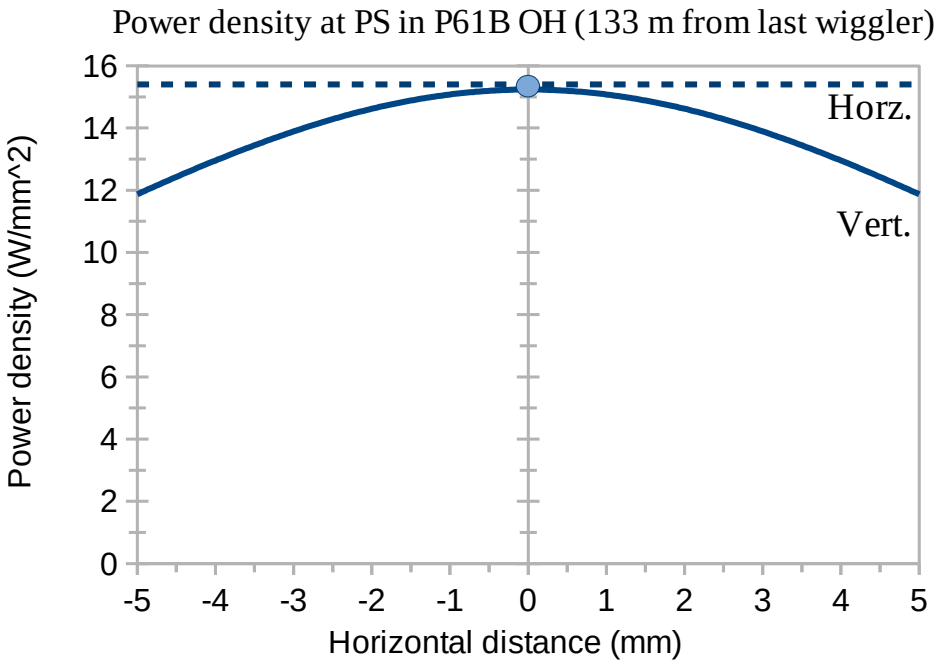


P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

CUMULATIVE POWER DENSITY FROM ALL WIGGLERS

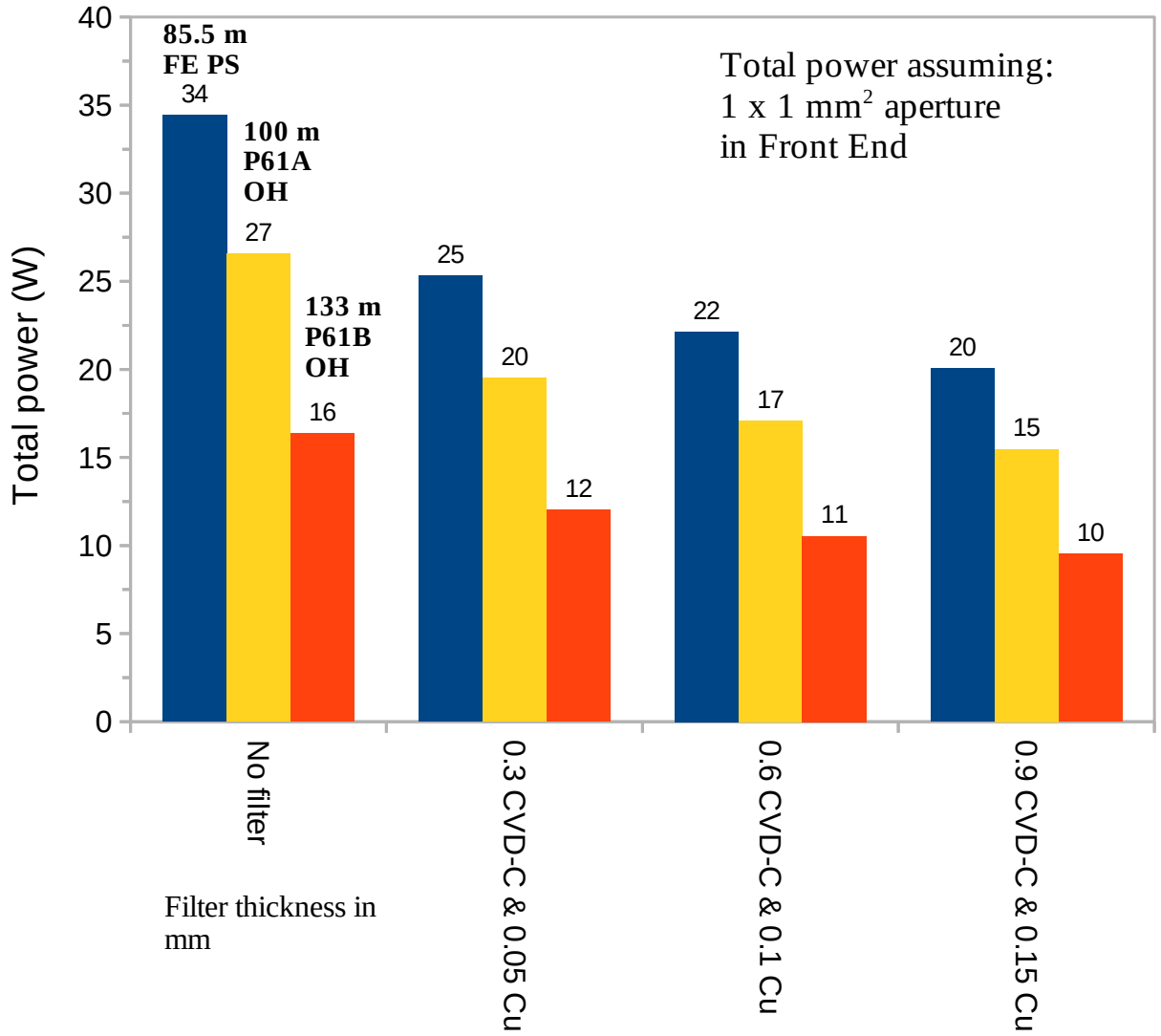




P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

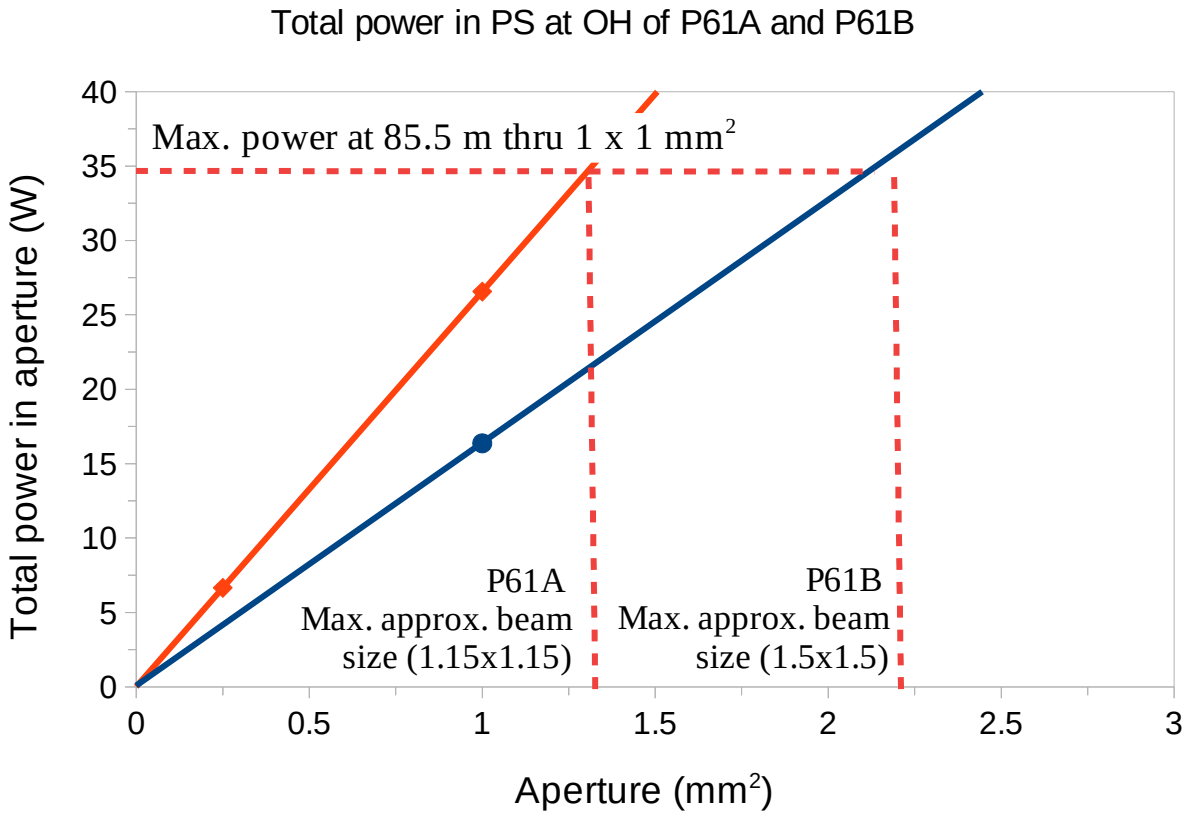
CUMULATIVE POWER FROM ALL WIGGLERS AFTER 1 X 1 MM^2 APERTURE IN FRONT END (85.5 M) AND AT P61B OH (133 M)



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

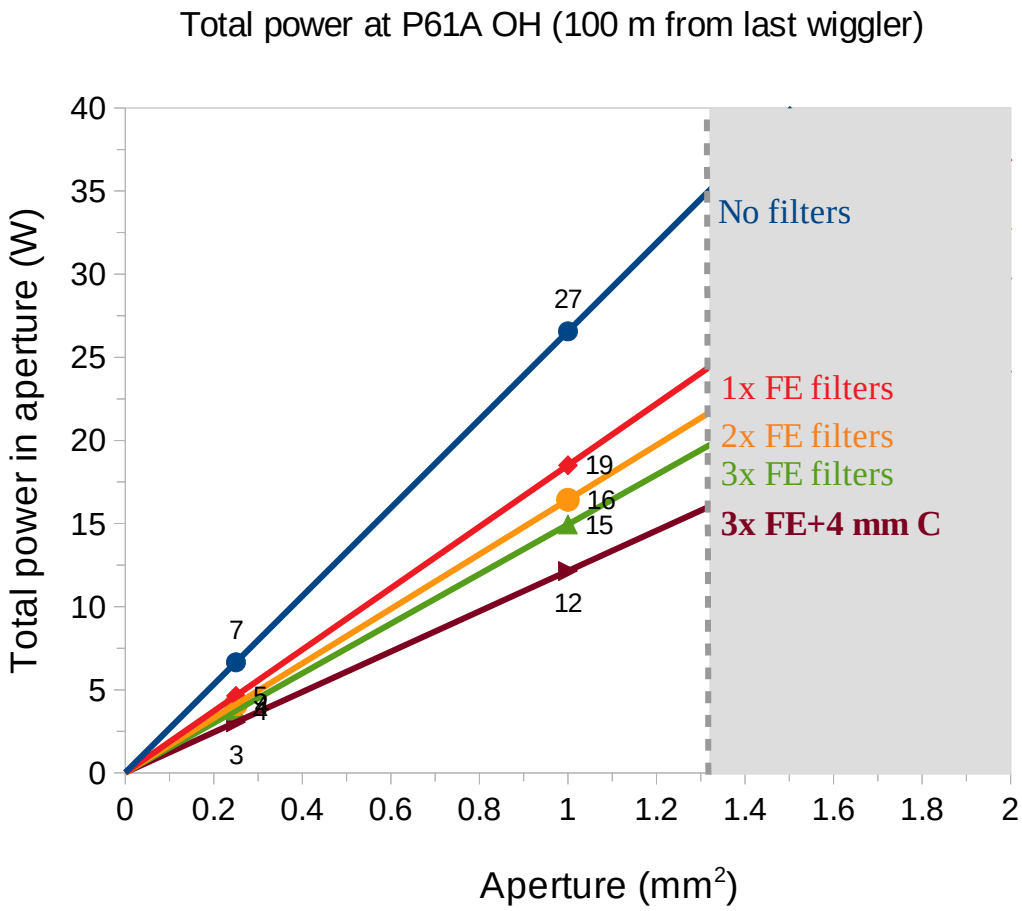
TOTAL UNFILTERED POWER FROM ALL WIGGLERS FOR RANGE OF APERTURES IN PS AT P61B OH (**133 M**)



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

TOTAL FILTERED POWER (INCL. 0.5 MM AL EXIT WINDOW), IN P61A OH (**100 M**)

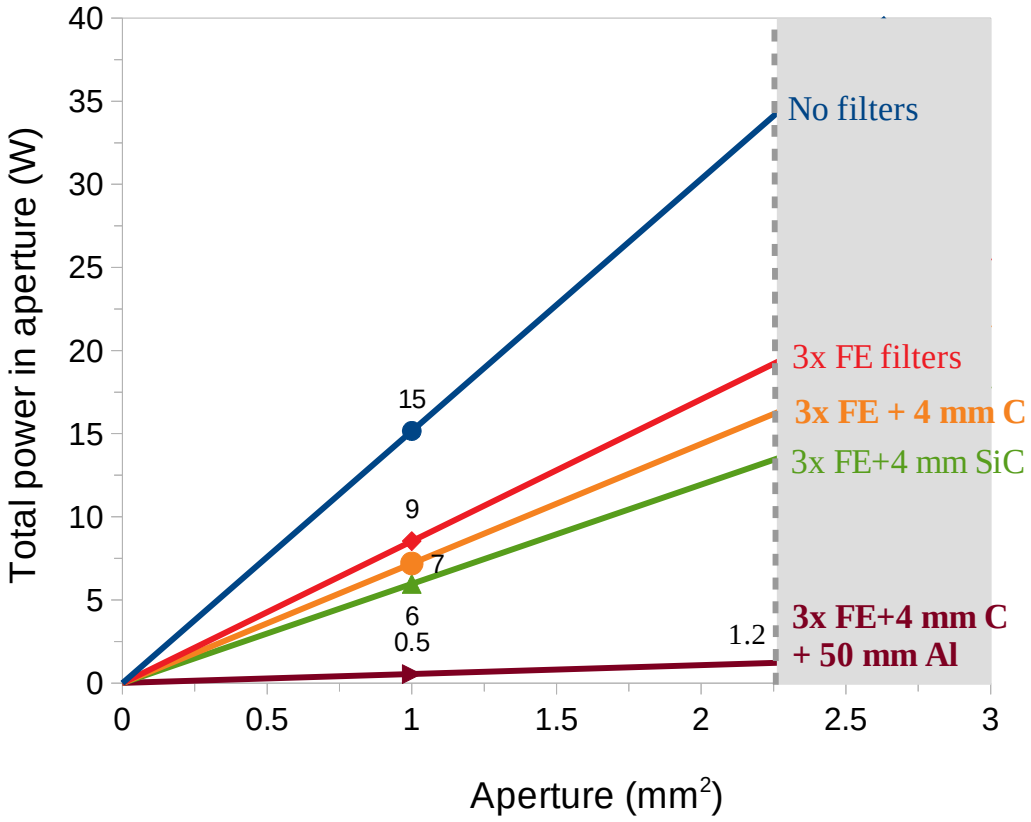


P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

TOTAL FILTERED POWER (INCL. 0.5 MM AL EXIT WINDOW), IN P61B EH (**139 M**) TO CMOS CAMERA/BEAMSTOP

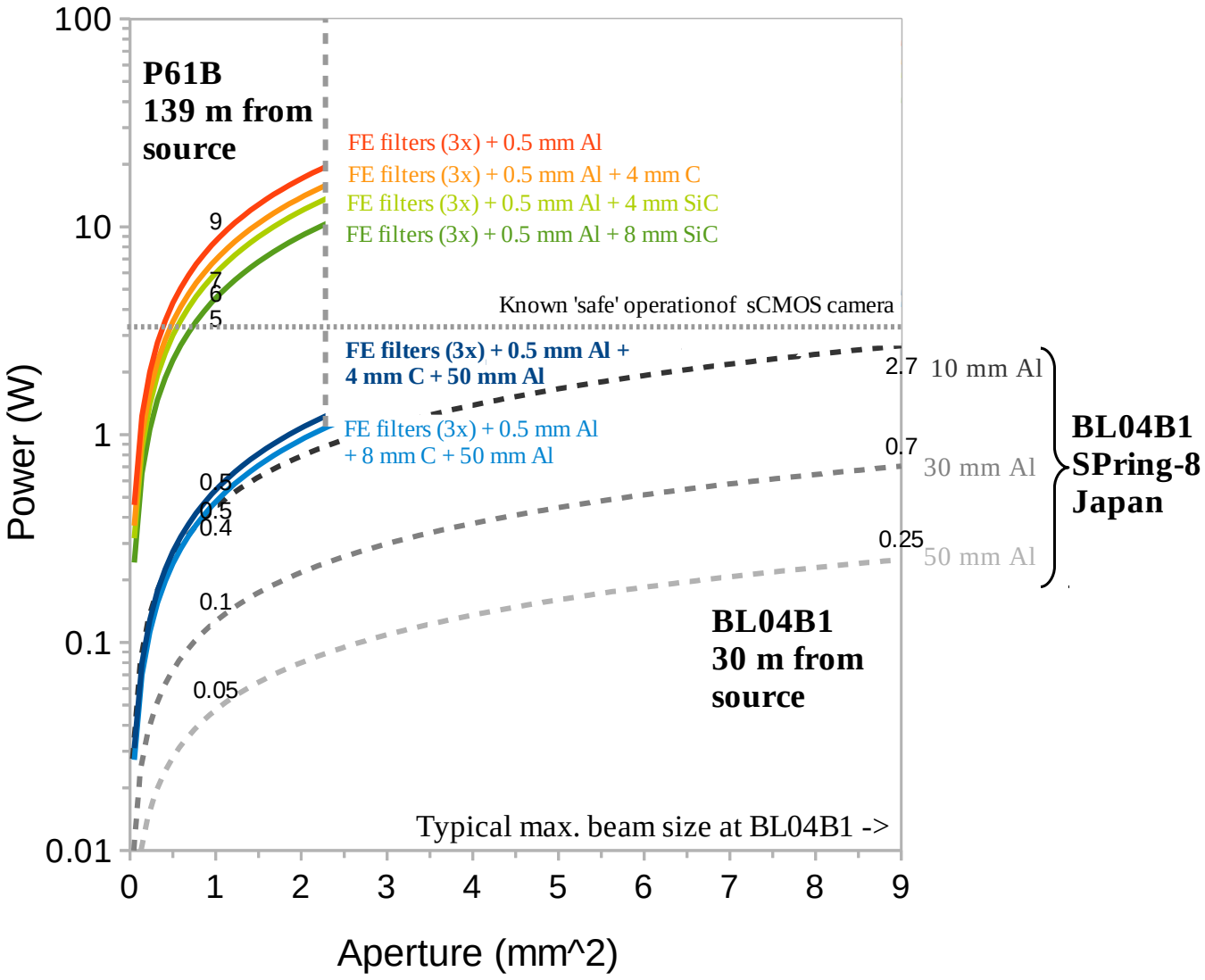
Total power to beam stop / CMOS camera at P61B EH (139 m from last wiggler)



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

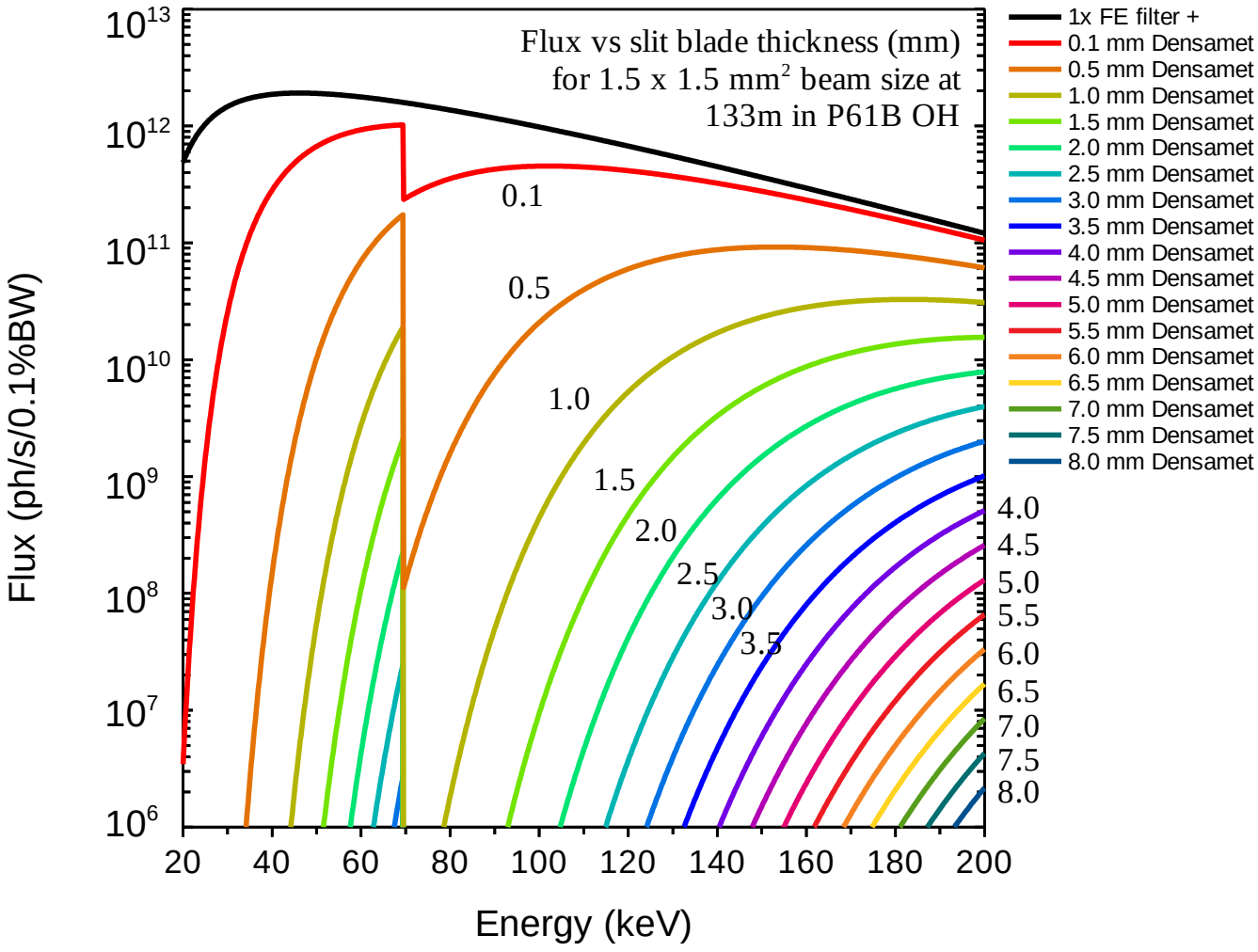
FILTERED POWER COMPARISON P61B WITH BL04B1 BEAMLINE AT SPRING-8



P61 Beamline

CALCULATIONS OF BEAMLINE CHARACTERISTICS

DENSAMET ($W_{95}NI_3FE_2$) BLADE THICKNESS FOR POWER SLITS IN P61B EH AT ~133M TO NEARLY ABSORB ALL X-RAYS



THIS RESULT SHOULD BE EQUIVALENT AT P61A AT 100M FOR BEAM SIZE OF 1.15 MM X 1.15 MM!

P61 Beamline

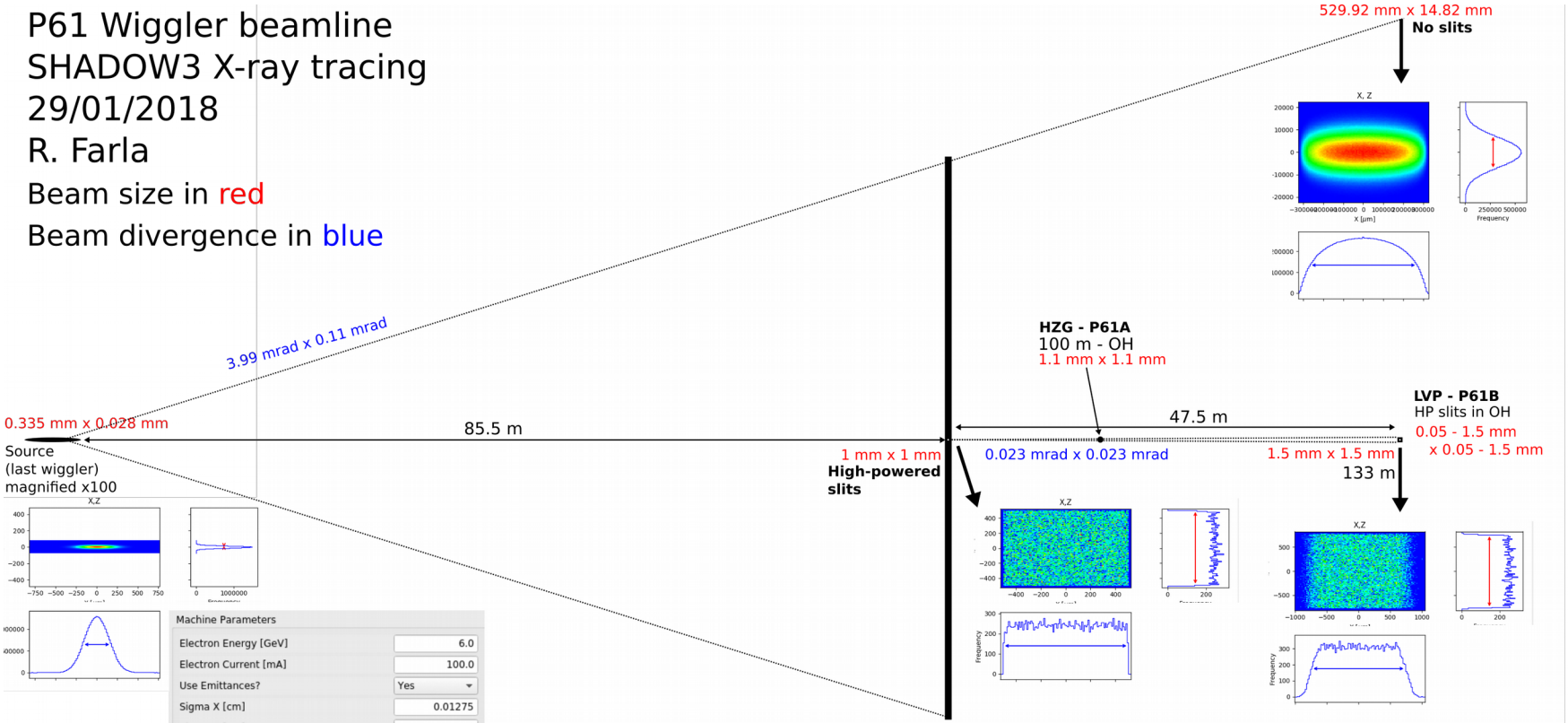
CALCULATIONS OF BEAMLINE CHARACTERISTICS

SUMMARY

Source	ID	Total power (kW)	Power density (W mm^{-1})	
PETRA III	DW	210	> 34	At 85.5 m (FE)
P61B		~0.034	15	at 139m (camera)
P61B	FE + 4mm C	~0.016	7 (filtered)	at 139m (camera)
P61B	+ 50 mm Al		**0.5 (filtered)**	at 139m (camera)
NSLS2	DW100	61	72	at 28m
			17	at 56m (sample)
		0.46 (mask)	**0.6 (filtered)**	at 28m
Spring-8	BM	0.01	1.6	at 30m
			0.4 (10mm Al)	at 30m
APS	BM		**0.82**	at 30m
NSLS	DW	52	6	at 30m
Australia	DW	8.5	7	at 30m

BEAM SIZE

P61 Wiggler beamline
SHADOW3 X-ray tracing
29/01/2018
R. Farla
Beam size in red
Beam divergence in blue



Machine Parameters	
Electron Energy [GeV]	6.0
Electron Current [mA]	100.0
Use Emittances?	Yes
Sigma X [cm]	0.01275
Sigma Z [cm]	0.001275
Emittance X [rad.cm]	1e-07
Emittance Z [rad.cm]	1e-09
Distance from Waist X [cm]	0.0
Distance from Waist Z [cm]	0.0
Electron Beam Parameters	
Shift Transversal Velocity	No shift
Shift Transversal Coordinate	Half excursion
Wiggler Parameters	
Type	conventional/sinusoidal
Number of Periods	19
K value	28.4
ID period [m]	0.2

PXN HALL – P61 HUTCH LAYOUT