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ID18 optics layout

The new beamline ID18 will be dedicated to life science and biomedical research. It will require the following principal optical layout:

Source / DMM / CRLs / DCM / KB / Focus

Photon energy: E = 7 - 40 keV

DMM design

Angle of incidence: θ = 0.40° - 0.20°
Source distance: 1st mirror: p_1 = 29.5 m
2nd mirror: p_2 = 24.9 m

The angles of incidence are relatively small to limit the heat load on the DMM.

To cover the energy range of E = 7 - 40 keV three different ML stripes are proposed. The following table summarizes the proposed ML parameters for each stripe.

Stripe number	#1		#2	#3
ML system	$[Ti(5.4)/C(11.9)]_{10}$	$[Ni(7.5)/B_4C(14.5)]_5$	$[Pd(3.9)/C(5.0)]_{15}$	$[W(2.0)/B_4C(2.8)]_{30}$
Density ρ (g/cm³)	4.55 / 2.20	8.50 / 2.50	10.70 / 2.20	16.60 / 2.90
Roughness σ (nm)	0.4 / 0.4	0.4 / 0.4	0.3 / 0.3	0.3 / 0.3
Energies (keV)	7 - 14	7 – 14	12-24	20-40
R^2	54% - 81%	91% - 82%	78% - 92%	66% - 87%
dE/E FWHM	9% - 11%	27% - 29%	13%	6.1% - 7.0%
L (mm)	300	300	300	300
Useful L (mm)	260	260	260	260
θ angles	0.40° - 0.20°	0.40° - 0.20°	0.40° - 0.20°	0.40° - 0.20°
Stress (GPa)	-0.23	-1.78	-0.78	-1.41
Force (GPa·nm)	40	191	104	203

The Ti/C will probably be preferred compared to Ni/B_4C (or NiV/B_4C), due to potential conflicts with spectroscopy studies near the Ni edge.