Infrared Microspectroscopy Station at BL43IR of SPring-8

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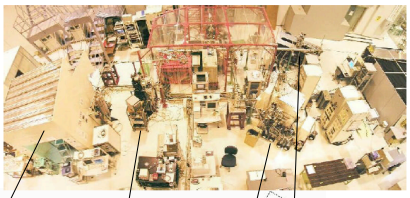
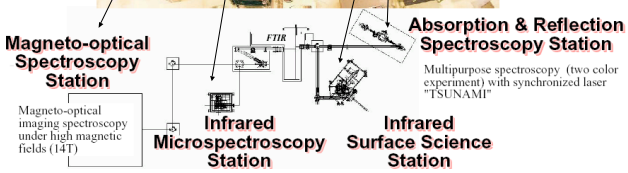
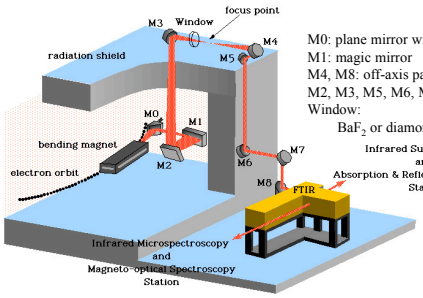
Experimental Stations of BL43IR

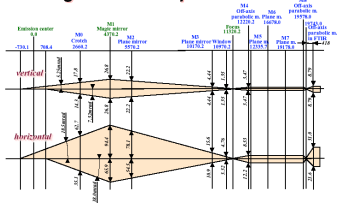






M0: plane mirror with slit
M1: magic mirror
M4, M8: off-axis parabolic mirror
M2, M3, M5, M6, M7: plane mirror
Window:
BaF_2 or diamond can be selected in vacuum

SPring-8 BL43IR Optics

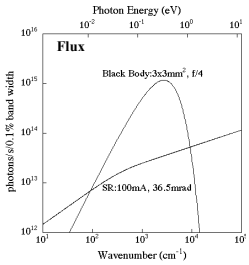


Parameters of BL43IR at SPring-8

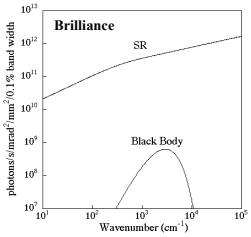
Storage ring energy	8 GeV
Stored current	100 mA
Bending radius	39.3 m
Magnetic filed	0.68 T
Horizontal acceptance angle	36.5 mrad
Vertical acceptance angle	±6.3 mrad
Length of the arc of electron orbit	1.44 m
Wavenumber	100 – 20000 cm^{-1}

Small storage ring
(e.g. UVSOR, ρ = 2.2 m)
electron beam
emission

Large storage ring
(SPring-8, ρ = 39.3 m)
electron beam
emission
small divergence !

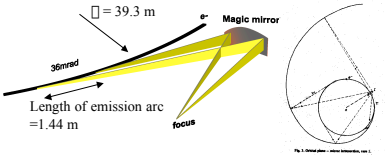


•Photon flux is not so high.
•Photon flux in far infrared region is high.



•Brilliance is high in all spectral range.

M1 mirror



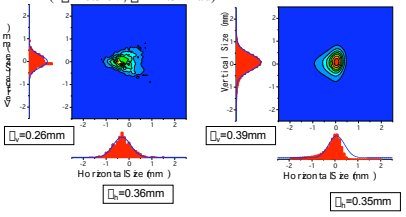
cf. R. Lopez-Delgado and H. Szwarc, Opt. Commun. **19**, 286 (1976).

"Focusing all the synchrotron radiation (2π radians) from an electron storage ring on a single point without time distortion"

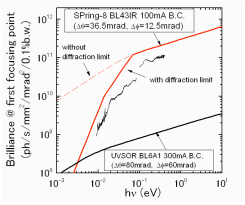
•In order to focus the light from the long source, the formula proposed by Lopez-Delgado and Szwarc was adopted for the horizontal direction.

•The vertical direction is approximated by a spherical curve.

Beam size at the first focusing point

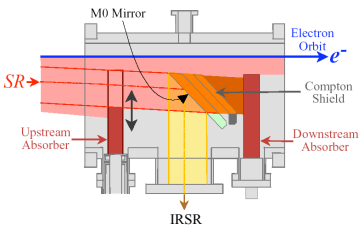


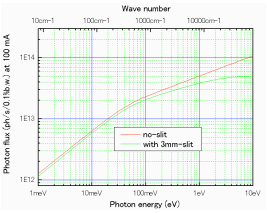
Brilliance at the first focusing point



M0 mirror

Schematic top view of M0 mirror





•In infrared region, the photon flux decreases only about 9 % by the slit.

•The substrate is Glidcop. The coating is Au.

•The mirror has a slit of ±1.5 mm (±0.6 mrad) width in the orbital plane.

•The high energy light, such as hard and soft X ray, goes through the slit to downstream absorber.

•The power on the mirror is reduced from 5.7 kW to 3 W.

•The mirror is kept away from the Compton scattering from the downstream absorber by the Compton shield, that is cooled by water indirectly. The substrate is OFC.