S1. 付録

表1. 硬X線実験ステーションの性能表

ステーション名	水平取込角 (mrad)	分光器	ミラー	光のエネルギー範囲 (keV)	ビームサイズ (H×V) (mm)	試料位置での光子数 (photons/s)	エネルギー分解能 ($\Delta E/E$)$\times 10^{-4}$	参考文献
BL-1A	0.01	Channel-Cut Si(111) Liquid N$_2$ Cooling	Bimorph Si Rh-Coated Si Rh-Coated	3.7 ~ 4.5 11.2 ~ 12.9	0.013×0.013	5×10^{10}@11.2 keV	~2	1
BL-3A	1	Flat Double Crystal Si(111)	Bent Cylinder	4 ~ 14	0.7×0.2	6×10^{12}	~5	2, 3
BL-3C	1.75	Double Crystal Si(111)	None	4 ~ 20 or white	20×6 (mono) 0.1×0.1 (white)		~2	
BL-4A	6	Double Crystal Si(111)	KB mirror polycapillary	4 ~ 17	0.005×0.005 0.03×0.03		~2	4, 5
BL-4B2	4.5	Flat Double Crystal Si(111)	Bent Cylinder	6 ~ 20	13×2		~2	6, 7
BL-4C	2	Flat Double Crystal Si(111)	Bent Cylinder	5 ~ 19	0.7×0.5		~5	8, 9
BL-5A	0.125	Double Crystal Si(111) Liquid N$_2$ Cooling	Bent Plane Si Rh-Coated Bent Cylinder Si Rh-Coated	6.5 ~ 17	0.8×0.2	1.3×10^{11} (0.2×0.2 mm^2)	~2	
BL-6A	2	Bent Crystal Ge(111) (α = 8.0°)	Bent Cylinder ULE	8.3 (fixed)	0.5×0.2	1.0×10^{12}/mm^2 (Slit full-open)	~10	10
BL-6C	2	Flat Double Crystal Si(111)	Bent Cylinder	5 ~ 20 (~25 non- Focus)	0.5×0.3			
BL-7C	4	Double Crystal Si(111) Sagittal Focusing	Double Mirror Fused Quartz Focusing	4 ~ 20 (4 ~ 13)	5×1	1×10^{10}/6 mm^2 (8 keV, 300 mA) (1×10^{11} when focused)	~2	11 - 13
BL-8A	2.22	Flat Double Crystal Si(111)	Bent Cylinder	5 ~ 19	0.82×0.52	3.2×10^{11} (12.4 keV, 400 mA)	~5	14
BL-8B	2.21	Flat Double Crystal Si(111)	Bent Cylinder	5 ~ 19	0.75×0.45	2.2×10^{11} (12.4 keV, 400 mA)	~5	14
BL-9A	3	Double Crystal Si (111)	Collimating and Focusing Bent Conical Mirrors Rh-Coated Double Flat Mirror Ni-Coated		0.5×0.3	6×10^{11} (7 keV, 450 mA)	2	15, 16
BL-9C	3.5	Double Crystal Si(111)	Bent Cylinder Rh-Coated Si	4 ~ 23		1×10^{11} (8 keV, 450 mA)	~2	
BL-10A	1	Si(111), Si(311) Quartz(100) PG(002) Curved Si(111) (α~ 4°, 8°)	Plane Pt Coated Fused Quartz	5 ~ 25	10×3		10~5	17
BL-10C	2.1	Fix-Exit Double Crystal Si(111)	Bent Cylinder Rh-Coated	6 ~ 14	0.63×0.18	1.5×10^{11} (8 keV)	2	
BL-12C	2	Double Crystal Si(111)	Bent Cylinder Double Flat Mirror Ni-Coated	4 ~ 23	0.6×0.6	9×10^{10} (8 keV, 450 mA)	~2	18

ステーション名	水平取込角 (mrad)	分光器	ミラー	光のエネルギー範囲 (keV)	ビームサイズ (H×V) (mm)	試料位置での光子数 (photons/s)	エネルギー分解能 ($\Delta E/E$)×10^{-4}	参考文献
BL-14A	1.28 (Vertical)	Double Crystal Si (111) Si (311) Si (553)	Bent Cylinder Rh-Coated Fused Quartz	5.1 ~ 19.1 9.9 ~ 35.6 22.7 ~ 84.5	2×1 at focus 5×38		2	19
BL-14B	2.2 (Vertical)	Flat Double Crystal Si(111)	None	10 ~ 57	5×14		2	20
BL-14C	1.96 (Vertical)	Double Crystal Si(111), Si(220)	None	5 ~ 100 or white	6×70		2	21, 22
BL-15A1 BL-15A2	0.2	Double Crystal Si(111) Liquid N_2 Cooling	Horizontal: Bent Plane Si Bimorph Silica Rh-Coated Vertical: Bent Plane Si Rh-Coated Double Flat Si Ni-Coated	2.1 ~ 15	0.02×0.02 0.6×0.04	3.5×10^{11} (7.5 keV, 450 mA)	~2	23
BL-17A	0.1 ~ 0.2	Double Crystal Si(111) Liquid N_2 Cooling	Bent Plane Si Rh-Coated Bent Plane Si Rh-Coated	6 ~ 13	0.25×0.04	10^{10} (12.4 keV, 450 mA, 0.02×0.02 mm²)	~2	24 - 26
BL-18B [India, DST]	2	Double Crystal Si(111)	Plane and Bent Cylinder	6 ~ 20			~2	
BL-18C	1	Double Crystal Si(111)	Cylinder Fused Quartz Pt-Coated	6 ~ 25	0.07×0.04		~2	
BL-20B	2	Double Crystal Si(111)	None	5 ~ 25 or white	26×5	1×10^{11} (12 keV, 450 mA)	~2	
BL-27B	4	Double Crystal Si(111)	None	4 ~ 20	100×6		~2	27
AR-NE1A	0.28	Micro-Channel Double Crystal Si(111), High-Resolution Channel Cut Si(4,2,2)&(12,2,2)	Bent Plane W/C Multilayer Coated Si	6 ~ 50	0.8×0.2	8×10^{11} (0.2×0.2mm²)	~2	
AR-NE3A	H:0.2 V:0.1	Double Crystal Si(111) Liquid N_2 Cooling	Pre-Mirror Bent Flat Si Rh-Coated Post-Mirror Bent Cylinder Fused Quartz Rh-Coated	6.5 ~ 17	0.8×0.2	8×10^{11} (0.2×0.2 mm²)	~2	28, 29
AR-NE5C	3	Double Crystal Si(111)	None	30 ~ 100 or white	60×5		5	30
AR-NE7A	4	Double Crystal Si(111)		25 ~ 50 or white	80×3		5	
AR-NW2A	H:1.0 V:0.2	Double Crystal Si(111) Liquid N_2 Cooling	Bent Cylinder Si Rh-Coated Bent Flat Si Rh-Coated	5 ~ 25	0.6×0.2 ~10×0.06	6×10^{12} (12 keV, 60 mA)	~2	31 - 33
AR-NW10A	1.2	Si(311)	Pt-Coated Bent Cylinder Double Flat Mirror Rh-Coated	8 ~ 42	2.2×0.5	1×10^{10} (22 keV, 60 mA)	~1	34

India DST: インド政府科学技術省（Department of Science & Technology）

ステーション名	水平取込角 (mrad)	分光器	ミラー	光のエネルギー範囲 (keV)	ビームサイズ（H×V）(mm)	試料位置での光子数 (photons/s)	エネルギー分解能 $(\Delta E/E)\times 10^{-4}$	参考文献
AR-NW12A	H:0.3 V:0.1	Double Crystal Si(111) Liquid N_2 Cooling	Pre-Mirror Bent Flat Si Rh-Coated Post-Mirror Bent Cylinder Si Rh-Coated	6.5 ~ 17	1.3×0.3	2×10^{11} (0.2×0.2 mm^2)	~2	35 - 37
AR-NW14A	H:0.3 V:0.1	Double Crystal Si(111) Liquid N_2 Cooling	Bent Cylinder Rh-Coated Bent Flat Rh-Coated	4.9 ~ 25	0.45×0.25	1×10^{12}	~2	38

REFERENCES

[1] Liebschner *et al*. Acta Cryst. D **72**, 728 (2016).

[2] Photon Factory Activity Report 2006, #**24**, A 64 (2008).

[3] Photon Factory Activity Report 2006, #**24**, A 104 (2008).

[4] A. Iida, X-Ray Spectrom. **26**, 359 (1997).

[5] A. Iida, X-Ray Spectrom. **40**, 376 (2011).

[6] Powder Diffraction User Group, KEK Report 94-11 (1995).

[7] H. Toraya, H. Hibino, and K. Ohsumi, J. Synchrotron Rad. **3**, 75 (1996).

[8] H. Iwasaki *et al.*, Rev. Sci. Instrum. **60**, 2406 (1989).

[9] Photon Factory Activity Report 1995 #**13**, E-1 (1996).

[10] N. Shimizu *et al.*, J. Phys.: Conf. Ser. **425**, 202008 (2013).

[11] M. Nomura and A.Koyama, KEK Internal, 93-1 (1993).

[12] M. Nomura *et al.*, KEK Report, 91-1 (1991).

[13] M. Nomura and A. Koyama, in "X-ray Absorption Fine Structure", ed. by S. S. Hasnain, Ellis Horwood, Chichester, **667** (1991).

[14] A. Nakao *et al.*, AIP Conf. Proc. **1234**, 367 (2010).

[15] M. Nomura and A. Koyama, J. Synchrotron Rad. **6**, 182 (1999).

[16] M. Nomura and A. Koyama, Nucl. Instrum. Meth. A **467-468**, 733 (2001).

[17] S. Sasaki, Rev. Sci. Instrum. **60**, 2417 (1989).

[18] M. Nomura and A. Koyama, KEK Report, 95-15 (1996).

[19] Y. Satow and Y. Iitaka, Rev. Sci. Instrum. **60**, 2390 (1989).

[20] M. Ando *et al*., Nucl. Instrum. Meth. A**246**, 144 (1986).

[21] Photon Factory Activity Report 1999, #**17**, A 92 (2000).

[22] Photon Factory Activity Report 1999, #**17**, A 103 (2000).

[23] N. Igarashi *et al*., J. Phys.: Conf. Ser. **425**, 072016 (2013).

[24] N. Igarashi *et al*., AIP Conf. Proc. **879**, 812 (2007).

[25] N. Igarashi *et al*., J. Synchrotron Rad. **15**, 292 (2008).

[26] Y. Yamada *et al*., J. Synchrotron Rad. **20**, 938 (2013).

[27] H. Konishi *et al*., Nucl. Instrum. Meth. A **372**, 322 (1996).

[28] Y. Yamada *et al*., AIP Conf. Proc. **1234**, 415 (2010).

[29] M. Hiraki *et al*., AIP Conf. Proc. **1234**, 673 (2010).

[30] T. Kikegawa *et al*., Rev. Sci. Instrum. **66**, 1335 (1995).

[31] T. Mori *et al*., AIP Conf. Proc. **705**, 255 (2004).

[32] H. Kawata *et al*., AIP Conf. Proc. **705**, 663 (2004).

[33] Y. Inada *et al*., AIP Conf. Proc. **879**, 1230 (2007).

[34] M. Nomura *et al*., AIP Conf. Proc. **882**, 896 (2007).

[35] L. M. G. Chavas *et al*., J. Synchrotron Rad. **19**, 450 (2012).

[36] L. M. G. Chavas *et al*., J. Phys.: Conf. Ser. **425**, 012008 (2013).

[37] L. M. G. Chavas *et al*., J. Synchrotron Rad. **20**, 838 (2013).

[38] S. Nozawa *et al*., J. Synchrotron Rad. **14**, 313 (2007).

表 2. 真空紫外・軟 X 線実験ステーションの性能表

ステーション名	スリットサイズ $H \times V$ (mrad) またはアンジュレータのパラメータ	分光器	溝密度 (/mm)	光のエネルギー範囲 (eV)	ビームサイズ $H \times V$ (mm)	エネルギー分解能 $(\Delta E/E) \times 10^{-4}$	参考文献
BL-2A ID02-1: Planer Undulator ID02-2: Variable Polarized Undulator	ID02-1: $K_{max} = 2.3$, $\lambda_u = 6$ cm ID02-2: $K_{max} = 4.93$, $\lambda_u = 16$ cm	Variable-Included-Angle Varied-Line-Spacing Plane Grating	400 600 1000	30 ～ 2000	~0.5 × 0.1	2000 ～ 20000 $10^{13} \sim 10^{11}$	1
BL-2B ID02-1: Planer Undulator ID02-2: Variable Polarized Undulator	ID02-1: $K_{max} = 2.3$, $\lambda_u = 6$ cm ID02-2: $K_{max} = 4.93$, $\lambda_u = 16$ cm	Variable-Included-Angle Varied-Line-Spacing Plane Grating Double Crystal InSb(111), Ge(111), Si(111)	400 600 1000	30 ～ 4000	~0.5 × 0.1	2000 ～ 20000 $10^{13} \sim 10^{11}$	1
BL-3B	10×2	Grazing Incidence $R = 24$ m $\alpha+\beta = 165°$ 1800	200 600	10 ～ 280	< 2φ	200 ～ 3000 $10^{12} \sim 10^{9}$	2, 3
BL-7A [RCS]	6×1	Varied-Line-Spacing Plane Grating	150 300 650	50 ～ 1300	2.5×0.5	1000 ～ 9000 $10^{12} \sim 10^{9}$	4
BL-11A	5×1	Varied-Included-Angle Varied-Line-Spacing Plane Grating	600 1200	70 ～ 1900	2×1	500 ～ 5000 $10^{12} \sim 10^{9}$	
BL-11B	4×0.6	Double Crystal InSb (111), Si (111)		1724 ～ 5000	5×2	2000 10^{10}	5-7
BL-11D	4×2	Grazing Incidence Varied Deviation-Angle On-Blaze Mount $R_1 = 52.5$ m $R_3 = 22.5$ m	2400	60 ～ 245 200 ～ 900	1×0.1	2000 10^{11}	8, 9
BL-13A/B Variable Polarized Undulator	$K_{max} = 5.28$ (Horizontal Linear Polarization) $K_{max} = 3.65$ (Vertical Linear Polarization) $\lambda_u = 7.6$ cm	Variable-Included-Angle Varied-Line-Spacing Plane Grating	300 1000	50 ～ 330 100 ～ 2000	~0.22×0.05	4000 ～ 12000 $10^{13} \sim 10^{9}$	10-12
BL-16A ID16-1 & ID16-2: Variable Polarized Undulator	$K_{max} = 2.37$ (Circular Polarization) $K_{max} = 3.12$ (Horizontal Linear Polarization) $K_{max} = 1.98$ (Vertical Linear Polarization) $K_{max} = 1.73$ (45-deg Linear Polarization) $\lambda_u = 5.6$ cm	Variable-Included-Angle Varied-Line-Spacing Plane Grating	100, 250, 500, 1000	250 ～ 1500	~0.2 × 0.1	4000 ～ 8000 $10^{12} \sim 10^{11}$	13, 14
BL-19B Revolver Undulator	$K = 0.5 \sim 1.25$ $\lambda u = 5$ cm	Varied-Line-Space Plane Grating	800 2400	200 ～ 1200	1×0.5	4000~8000 $10^{12} \sim 10^{11}$	15-17
BL-20A	28 × 5	3 m Normal Incidence	1200 2400	5 ～ 40	2×1	300~30000 $10^{12} \sim 10^{8}$	18

RCS: 東京大学大学院理学系研究科附属スペクトル化学研究センター（Research Center for Spectrochemistry）

BL-27A	5 × 0.5	Double Crystal InSb (111)		1800~ 4000		2000	19
BL-28A/B Variable Polarized Undulator	$K_{max} = 4.93$ (Horizontal Linear Polarization) $K_{max} = 4.93$ (Vertical Linear Polarization) $\lambda_u = 16.0$ cm	Variable-Included-Angle Varied-Line-Spacing Plane Grating	400	30 ~ 300	0.15×0.05	30000 10^{12}	1

REFERENCES

[1] K. Amemiya and T. Ohta, J. Synchrotron Rad. **11**, 171 (2004).

[2] A. Yagishita *et al.*, Nucl. Instrum. Meth. A **306**, 578 (1991).

[3] S. Masui *et al.*, Rev. Sci. Instrum. **63**, 1330 (1992).

[4] K. Amemiya *et al.*, J. Elec. Spectrosc. Relat. Phenom. **124**, 151 (2002).

[5] T. Ohta *et al.*, Nucl. Instrum. Meth. A **246**, 373 (1986).

[6] M. Funabashi *et al.*, Rev. Sci. Instrum. **60**, 1983 (1989).

[7] T. Iwazumi *et al.*, Rev. Sci. Instrum. **66**, 1691 (1995).

[8] Photon Factory Activity Report 1997 #**15**, A 101 (1998).

[9] T. Hatano and S. Aihara, J. Phys.: Conf. Ser. **425**, 152018 (2013).

[10] K. Mase *et al.*, AIP Conf. Proc. **1234**, 709 (2010).

[11] A. Toyoshima *et al.*, J. Vac. Soc. Jpn. **54**, 580 (2011).

[12] A. Toyoshima *et al.*, J. Phys.: Conf. Ser. **425**, 152019 (2013).

[13] K. Amemiya *et al.*, AIP Conf. Proc. **1234**, 295 (2010).

[14] K. Amemiya *et al.*, J. Phys.: Conf. Ser. **425**, 152015 (2013).

[15] S. Suzuki *et al.*, Activity Report of SRL-ISSP 60, (1989).

[16] A. Kakizaki *et al.*, Rev. Sci. Instrum. **60**, 1893 (1989).

[17] A. Kakizaki *et al.*, Rev. Sci. Instrum. **63**, 367 (1992).

[18] K. Ito *et al.*, Rev. Sci. Instrum. **66**, 2119 (1995).

[19] H. Konishi *et al.*, Nucl. Instrum. Meth. A**372**, 322 (1996).

表 3. 低速陽電子実験ステーションの性能表

ステーション名	ビームエネルギー	パルス幅	繰り返し周波数	ビーム強度	参考文献
SPF-A3	100 eV - 35 keV	1 μs	≤ 50 Hz	5×10^7 e+/s (5×10^6 e+/s after brightness enhancement)	1, 2, 3
SPF-B1	100 eV - 35 keV	1-10 ns	≤ 50 Hz	5×10^6 e+/s	4, 5
SPF-B2	100 eV - 35 keV	1-10 ns	≤ 50 Hz	5×10^6 e+/s	6

REFERENCES

[1] K. Wada, *et al.*, Eur. Phys. J. D **66**, 37 (2012).

[2] K. Wada, *et al.*, J. Phys.: Conf. Ser. **443**, 012082 (2013).

[3] M. Maekawa, *et al.*, Eur. Phys. J. D **68**,165 (2014).

[4] K. Michishio, *et al.*, Appl. Phys. Lett. **100**, 254102 (2012).

[5] K. Michishio, *et al.*, Nucl. Instrum. Methods **785**, 5 (2015).

[6] H. Terabe, *et al.*, J. Phys.: Conf. Ser. **443**, 012075 (2013).