

APPENDIX

ORGANIZATION

Staff

Director

Kyuya YAKUSHI Professor

Scientific Staff

Light Source

Goro ISOYAMA Associate Professor

Hiroyuki HAMA Research Associate

Beam Line

Makoto WATANABE Associate Professor(- September 1993)
Adjunct Professor from Tohoku
Univ.(October 1993- March 1994)

Masao KAMADA Associate Professor

Atsunari HIRAYA Research Associate

Shin-ichiro TANAKA Research Associate

Shin-ichi KIMURA Reaserch Associate (October 1993-)

Shigeo OHARA IMS Fellow (-November 1993)

Technical Staff

Kusuo SAKAI Section Chief Engineer

Osamu MATSUDO Unit Chief Engineer

Toshio KINOSHITA Engineer

Masami HASUMOTO Engineer

Jun-ichi YAMAZAKI Engineer

Eiken NAKAMURA Engineer

Secretary

Hisayo HAGIWARA

Guest Scientist

Kazumichi NAKAGAWA Adjunct Associate Professor
from Kobe Univ. (April 1993-)

Graduate Student

Sayumi HIROSE

Representative of Beam Lines (January 1994)

BL1A Nobuhiro KOSUGI Dept. Vacuum UV Photoscience

BL2A Nobuhiro KOSUGI Dept. Vacuum UV Photoscience

Kosuke SHOBATAKE Adjunct Professor from

			Nagoya Univ. (April 1994-)
BL2B2	Koichiro	MITSUKE	Dept. Vacuum UV Photoscience
BL3B	Koichiro	MITSUKE	Dept. Vacuum UV Photoscience
BL4A	Tsuneo	URISU	Dept. Vacuum UV Photoscience
BL4B	Tsuneo	URISU	Dept. Vacuum UV Photoscience
BL6A2	Masao	KAMADA	UVSOR
BL6B	Kyuya	YAKUSHI	Dept. Molecular Assemblies
BL8B2	Kyuya	YAKUSHI	Dept. Molecular Assemblies
	Nobuhiro	KOSUGI	Dept. Vacuum UV Photoscience
Others	Masao	KAMADA	UVSOR

Steering Committee (April 1992 - March 1994)

Kyuya	YAKUSHI	IMS Chairman
Masahiro	KOTANI	Gakushuin Univ.
Kaizo	NAKAMURA	Okayama Univ.
Yukinori	SATO	Tohoku Univ.
Noriaki	ITOH	Nagoya Univ.
Akito	KAKIZAKI	Tokyo Univ.
Toshio	KASUGA	KEK
Tadashi	MATUSHITA	KEK
Kazumichi	NAKAGAWA	Kobe Univ., IMS
Yusei	MARUYAMA	IMS
Keitaro	YOSHIHARA	IMS
Norio	MORITA	IMS
Koichiro	MITSUKE	IMS
Makoto	WATANABE	IMS and Tohoku Univ.
Goro	ISOYAMA	IMS
Masao	KAMADA	IMS

JOINT STUDIES (fiscal year 1993)

Special Project	:2
Cooperative Research	:37
Cooperative Research (invited)	:9
Use of Facility	:123
Use of Facility (Private Company)	:2
User's Meeting	:1
Workshop on Beam Dynamics and Free Electron Laser	:1
User's Time	:42 (weeks)

LIST OF PUBLICATIONS (1993)

- 1) "Single-, Double-, and Triple-Photoionization Cross Sections of Carbonyl Sulfide (OCS) and Ionic Fragmentation of OCS^+ , OCS^{2+} , and OCS^{3+} "
T. Masuoka and H. Doi
Phys. Rev. A **47** (1993) 278.
- 2) "Luminescence of High-Temperature Single-Crystal Superconductors Cleaved in Ultrahigh Vacuum"
V. G. Stankevitch, N. Yu. Svechnikov, K. V. Kaznacheev, M. Kamada, S. Tanaka, S. Hirose, R. Kink, G. A. Emelchenko, S. G. Karabachev, T. Wolf, H. Berger and F. Levy
Phys. Rev. B **47** (1993) 1024.
- 3) "Ionic Fragmentation Processes following Si:2p Core Level Photoexcitation and Photoionization of 1,1,1-Trimethyltrichlorodisilane"
S. Nagaoka, J. Ohshita, M. Ishikawa, T. Masuoka and I. Koyano
J. Phys. Chem. **97** (1993) 1488.
- 4) "Gain Measurement of a Free Electron Laser with an Optical Klystron on the UVSOR Storage Ring"
S. Takano, H. Hama and G. Isoyama
Jpn. J. Appl. Phys. **32** (1993) 1285.
- 5) "Test of Holographic SiC Gratings for High-Power Synchrotron Radiation"
E. Ishiguro, H. Maezawa, M. Sakurai, M. Yanagihara, M. Watanabe, M. Koeda, T. Nagano, K. Sano, Y. Akune and K. Tanino
SPIE **1739** High Heat Flux Engineering (1992) 592.
- 6) "Mechanisms of Synchrotron Radiation-Excited Etching Reactions of Semiconductor Materials"
H. Ohashi, A. Yoshida, K. Tabayashi and K. Shobatake
Applied Surface Science **69** (1993) 20.
- 7) "Solid-state Effects on Nonradiative Decay of $4d^9 4f^1$ States in Barium Halides"
M. Kamada, K. Ichikawa and O. Aita
Phys. Rev. B **47** (1993) 3511.

- 8) "Laser Beam Profiler in the Vacuum Ultraviolet Spectral Range using Photostimulable Phosphor"
M. Katto, R. Matsumoto, K. Kurosawa, W. Sasaki, Y. Takigawa and M. Okuda
Rev. Sci. Instrum. **64** (1993) 319.
- 9) "Photoelectron Spectra of Acetone and Acetone Dimer"
K. Furuya, S. Katsumata and K. Kimura
Journal of Electron Spectroscopy and Related Phenomena **62** (1993) 237.
- 10) "Control of the Bunch Length on an Electron Storage Ring"
H. Hama, S. Takano and G. Isoyama
Nucl. Instrum. Meth. Phys. A **329** (1993) 29.
- 11) "Dissociation Dynamics of Doubly- and Triply-charged Molecules Studied by the Triple Photoelectron-photoion-photoion Coincidence Method"
T. Masuoka
J. Chem. Phys. **98** (1993) 6989.
- 12) "Desorption, Dissociation and Orientation of Oxygen Admolecules on a Reconstructed Platinum(110)(1×2) Surface Studied by Thermal Desorption and Near-edge X-ray-Absorption Fine-Structure"
Y. Ohno, T. Matsushima, S. Tanaka and M. Kamada
Jpn. J. Appl. Phys. **32** (1993) Suppl. 32-2, 383.
- 13) "Polarized Cu L Absorption Spectra of $\text{Bi}_2\text{Sr}_2\text{Ca}_{1-x}\text{Y}_x\text{Cu}_2\text{O}_8$ ($x=0.0,0.6$)"
S. Nakai, K. Matsuda, A. Kamata, K. Sano, K. Noguchi, H. Ishii, I. Shiozaki and H. Arai
Jpn. J. Appl. Phys. **32** (1993) Suppl. 32-2, 602.
- 14) "Time-Resolved Luminescence Study of Relaxed Excitons in KBr:I and KCl:Br"
T. Matsumoto, K. Ichinose and K. Kan'no
J. Phys. Soc. Jpn. **62** (1993) 1860.
- 15) "Lasing of a Free Electron Laser in the Visible on the UVSOR Storage Ring"
S. Takano, H. Hama and G. Isoyama
Nucl. Instrum. Meth. Phys. A **331** (1993) 20.
- 16) "Positive Ion-negative Ion Coincidence Spectroscopy of O_2 and H_2 using Synchrotron Radiation"
K. Mitsuke, H. Yoshida, H. Hattori
Z. Phys. D **27** (1993) 267.

- 17) "Negative-ion Mass Spectrometric Study of Ion-pair Formation in the Vacuum Ultraviolet. $\text{VII-SO}_2 \rightarrow \text{O}^- + \text{SO}^+, \text{O}^- + \text{S}^+ + \text{O}$ "
K. Mitsuke, S. Suzuki, T. Imamura, I. Koyano
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- 18) "Photodissociation of BrCN in the Vacuum Ultraviolet Region"
K. Kanda, S. Katsumata, T. Nagata, Y. Ozaki, T. Kondow, K. Kuchitsu,
A. Hiraya and K. Shobatake
Chem. Phys. **175** (1993) 399.
- 19) "Single-and Double-Photoionization Cross Sections of Nitric Oxide (NO) and Ionic Fragmentation of NO^+ and NO^{2+} "
T. Masuoka
Phys. Rev. A **48** (1993) 1955.
- 20) "Dissociation of Doubly Charged $\text{CH}_2=\text{CD}_2$ and $\text{CH}_2=\text{CF}_2$ in the Region of Valence Shell Photoexcitation"
T. Ibuki, T. Imamura, I. Koyano, T. Masuoka and C. E. Brion
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- 21) "X-ray Excited Luminescence Yield Spectra of NaBr and NaBr:Cu Single Crystals"
T. Murata, K. Harada, S. Emura, M. Nomura, K. R. Bauchspiess, H. Maeda,
A. Hiraya and M. Watanabe
Jpn. J. Appl. Phys. **32** (1993) Suppl. 32-2, 217.
- 22) "Core Electron Absorption Spectra of Polyester Films"
I. Ouchi, I. Nakai, M. Kamada and S. Tanaka
Reports on Progress in Polymer Physics in Japan **36** (1993) 413.
- 23) "Control System Capable of Gracefully Degraded Operation for the 750 MeV Synchrotron Radiation Source"
N. Kanaya, H. Hama, J. Yamazaki, O. Matsudo, G. Isoyama
T-NS **40** (1993) 1286.
- 24) "Ion-Pair Formation from Saturated Hydrocarbons Through Photoexcitation of an Inner-Valence Electron"
K. Mitsuke, H. Hattori and H. Yoshida
J. Chem. Phys. **99** (1993) 6642.

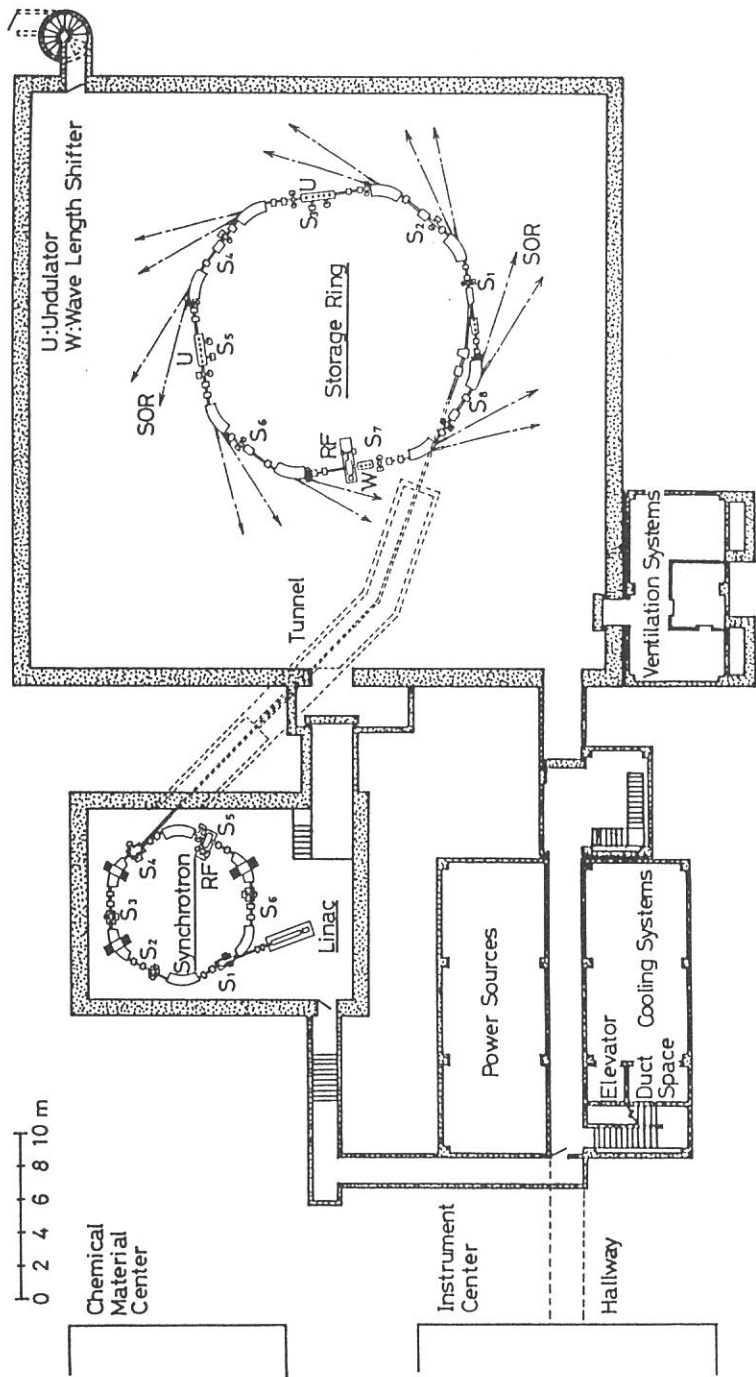
- 25) "Luminescence Decay Behavior of the On-Center Self-Trapped Excitons in Alkali Halides"
 T. Matsumoto, T. Kawata, A. Miyamoto and K. Kan'no
 Proceedings of ICDIM Nordkirchev (1992) 327.
- 26) "X-ray Absorption Near Edge Structure (XANES) Studies of Diluted Magnetic Semiconductors (DMS) $Zn_{1-x}Y_xS$ (Y=Mn, Fe, Co) Systems"
 W. F. Pong, R. A. Mayanovic, K. T. Wu, P. K. Tseng, B. A. Bunker,
 A. Hiraya and M. Watanabe
 Jpn. J. Appl. Phys. **32** (1993) Suppl. 32-2, 722.
- 27) "Optical Study of Electronic Structure and Nonmetal-Metal Transition of Gd_2S_3 "
 S. Kimura, F. Arai, T. Suzuki and M. Ikezawa
 J. Phys. Soc. Jpn. **62** (1993) 4331.
- 28) "Energy Gap State of Gd_2S_3 "
 S. Kimura, T. Suzuki, M. Ikezawa and T. Kasuya
 Phys. B 186-188 (1993) 387.
- 29) "Molecular Orientation in Thin Films of Bis(1,2,5-thiadiazolo)-*p*-Quinobis(1,3-dithiole) on Graphite Studied by Angle-resolved Photoelectron Spectroscopy"
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 K. Seki and N. Ueno
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- 30) "Infrared Lattice Vibration Spectra at Low Temperature in β - ZnP_2 "
 M. Sugisaki, M. Eguchi, O. Arimoto, K. Nakamura and M. Watanabe
 J. Phys. Soc. Jpn. **62** (1993) 4533.
- 31) "Double RF System for Suppression of Longitudinal Coupled Bunch Instability on UVSOR Storage Ring"
 K. Tamura, T. Kasuga, M. Tobiyama, H. Hama, G. Isoyama and T. Kinoshita
 Jpn. J. Appl. Phys. **33** (1994) L59-L62.
- 32) "Angle-resolved Photoemission from Langmuir-Blodgett films of Copper tetrakis(buthoxycarbonyl)phthalocyanine with Synchrotron Radiation"
 N. Ueno, K. Kamiya, K. Ogawa, H. Yonehara, M. Takahashi, H. Nakahara,
 K. Seki, K. Sugita, K. Fukuda and H. Inokuchi
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- 33) "Local Distortion of AsO_4 and PO_4 Molecules in KDP-Family Crystals"
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T. Umeki, Y. Yoneda, S. Murakami and Y. Kuroiwa
Jpn. J. Appl. Phys. **32** (1993) Suppl. 32-2, 740.
- 34) "Structures and Catalytic Behavior of Some Niobium Oxides"
S. Hasegawa, H. Aritani and M. Kudo
Catalysis Today **16** (1993) 371.
- 35) "Fluorescence Excitation Spectra and Quantum Yield in Vacuum Ultraviolet Photodissociation of CF_3CN "
D-C. Che, T. Kasai, H. Ohoyama, K. Kuwata, M. Kono, K. Tabayashi and
K. Shobatake
Chem. Lett. (1994) 133.
- 36) "Single-, Double-, and Triple-photonization Cross Sections of Carbon Monoxide (CO) and Ionic Fragmentation of CO^+ , CO^{2+} , and CO^{3+} "
T. Masuoka and E. Nakamura
Phys. Rev. A **48** (1993) 4379.
- 37) "Photoemission and NEXAFS Studies of Organic Molecular and Polymeric Materials"
K. Seki
Vacuum Ultraviolet Radiation Phys. (1993) 385.
- 38) "Auger-Free Luminescence from Large Gap Insulators"
S. Kubota
Vacuum Ultraviolet Radiation Phys. (1993) 511.
- 39) "Mechanism of the Photolysis of Iron Pentacarbonyl Adsorbed on a Pt Surface"
S. Sato and Y. Ukisu
Surf. Sci. **283** (1993) 137.
- 40) "Infrared Reflection Absorption Spectroscopy, X-ray Photoelectron Spectroscopy and Temperature-programmed Desorption Study on the Adsorption and Decomposition of $\text{Fe}(\text{CO})_5$ over Silver Surfaces"
S. Sato, Y. Ukisu, H. Ogawa and Y. Takasu
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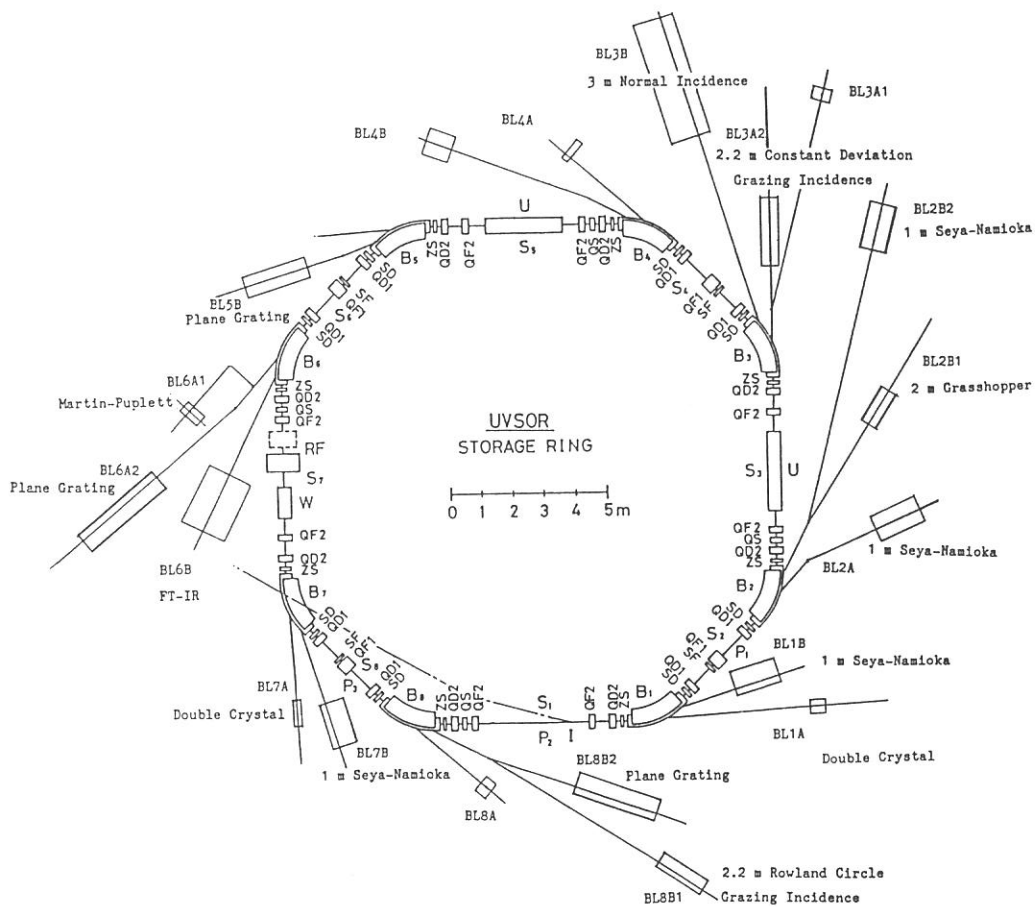
- 41) "Study on VUV Photochemical Reactions over Solid Surfaces"
S. Sato
New Functionality Materials, Vol. C Synthetic process and Control of
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1993) 201.
- 42) "Soft X-ray Microscope with Zone Plates at UVSOR"
N. Watanabe, Y. Shimanuki, M. Taniguchi and H. Kihara
Proc. SPIE 1741 (1992) 85.
- 43) "Observation of Biological Materials by X-ray Photoelectron-Conversion Microscopy"
N. Watanabe, T. matsumura, Y. Inagaki, K. Kinoshita, Y. Shimanuki, K.
Furuya, T. Taguchi, M. Taniguchi and H. Kihara
J. Microscopy **170** (1992) 141.
- 44) "Soft X-ray Microscopy with Zone Plates at UVSOR I: Its Performance"
N. Watanabe, Y. Shimanuki, M. Taniguchi and H. Kihara
Jpn. J. Appl. Phys. **32**(10) (1993) 4791.
- 45) "Time Response of Photon-Stimulated Desorption of Excited-State Sodium Atoms
from Sodium Halides"
S. Hirose and M. Kamada
Phys. Rev. B **48** (1993) 17641.
- 46) "Spectral Characteristic of Metallic State of Polyacetylene"
J. Tanaka, C. Tanaka, T. Miyamae, K. kamiya, M. Shimizu, M. Oku, K. Seki,
J. Tsukamoto, S. Hasegawa and H. Inokuchi
Syn. Metals 55-57 (1993) 121.
- 47) "Electronic Structure of Bis [1,2,5] Thiadiazolo-*p*-quinobis (1,3-dithiole) (BTQBT)
Studied by Ultraviolet Photoemission Spectroscopy"
H. Fujimoto, K. Kamiya, S. Tanaka, T. Mori, Y. Yamashita, H. Inokuchi and
K. Seki
Chem. Phys. **165** (1992) 135.
- 48) "Photoemission and Inverse Photoemission of Alkali-doped C₆₀"
T. Takahashi, T. Morikawa, H. Katayama-Yoshida, S. Hasegawa and
H. Inokuchi
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- 49) "Collapse of Mott–hubbard Framework by Hole Doping in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ "
T. Takahashi, S. Suzuki, T. Kusunoki and H. Katayama–Yoshida
Vacuum Ultraviolet Radiation Phys. (1992) 330.
- 50) "Pseudo–Gap and Electronic Structure Near the Fermi Level in Doped C_{60} "
T. Takahashi
Comments Cond. Mat. Phys. **16** (1992) 113.
- 51) "Photoemission Study of Superconductive and Non–superconductive Alkali–doped C_{60} and C_{70} "
T. Takahashi
Materials Science and Engineering **B19** (1993) 117.
- 52) "Precursor to Paramagnetic Centers Induced in Gamma–irradiated Doped Silica Glasses"
K. Awazu, H. Kawazoe, K. Harada, K. Kido and S. Inoue
J. Appl. Phys. **73** (1993)1644.
- 53) "Chemical Reactions of Ge–related Species in $\text{SiO}_2\text{:GeO}_2$ optical Fibers"
K. Awazu, H. Hosono and H. Kawazoe
SPIE **2044** (1993) 78.
- 54) "Photoelectron Spectra of a Higher Fullerene Compound C_{82} and Its Potassium Complex"
S. Hino, K. Matsumoto, S. Hasegawa, K. Iwasaki, K. Yakushi, T. Morikawa,
T. Takahashi, K. Seki, K. Kikuchi, S. Suzuki, I. Ikemoto and Y. Achiba
Synthetic Metals **55–57** (1993) 3191.
- 55) "Electronic Structure of Doped C_{60} : Strog Correlation or Lattice Distortion?"
T. Takahashi, T. Morikawa, H. Katayama–Yoshida, S. Hasegawa, H. Inokuchi,
K. Seki, S. Hino, K. Kikuchi, S. Suzuki, K. Ikemoto and Y. Achiba
Physca B **186–188** (1993) 1068.
- 56) "Ultraviolet Photoelectron Spectre of C_{82} and K_xC_{82} "
S. Hino, K. Matsumoto, S. Hasegawa, K. Iwasaki, K. Yakushi, T. Morikawa,
T. Takahashi, K. Seki, K. Kikuchi, S. Suzuki, I. Ikemoto and Y. Achiba
Phys. Rev. B **48** (1993) 8418.

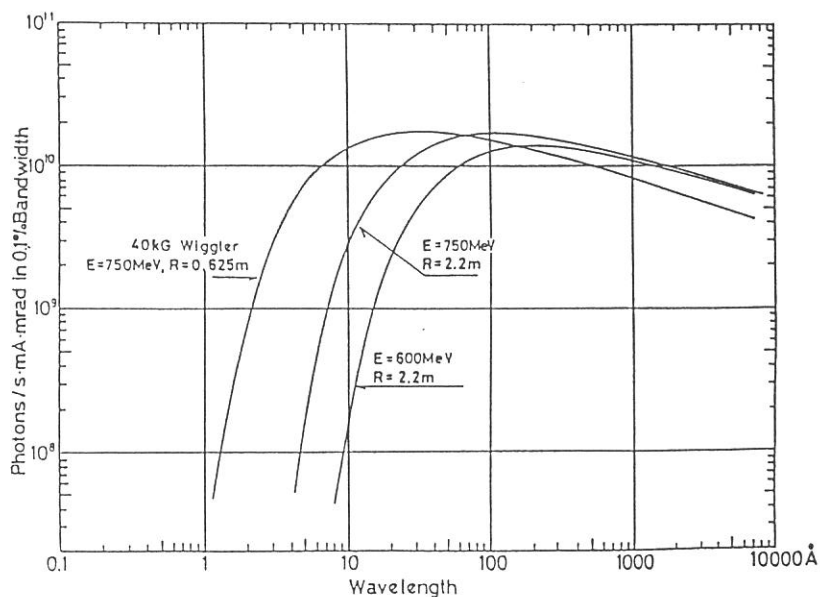
- 57) "Pseudo-gap at the Fermi Level in K3C60 Observed by Photoemission adninverse Photoemission"
 T. Takahashi, S. Suzuki, T. Morikawa, H. Katayama-Yashida, S. Hasegawa, H. Inokuchi, K. Seki, K. Kikuchi, S. Suzuki, K. Ikemoto and Y. Achiba
 Phys. Rev. Lett. **68** (1992) 1232.
- 58) "Mono- and Multilayers of Novel Molecular Complex of Thiphenes Derivative with Long-chain TCNQ"
 H. Nakahara, A. Nagasawa, A. Ishii, J. Nakayama, M. Hoshino, K. Fukuda, K. Kamiya, C. Nakano, U. Nagashima, K. Seki and H. Inokuchi
 Mol. Cryst. Liq. Crust. **227** (1993) 13.
- 59) "Angle-resolved Photoemission Spectroscopy of Ultrathin Films of H₂-phthalocyanine on MoS₂ Surfaces"
 N. Ueno, K. Suzuki, S. Hasegawa, K. Kamiya, K. Seki and H. Inokuchi
 J. Chem. Phys. **99** (1993) 7169.
- 60) "Mechanism of Photostimulated Luminescence Process in BaFBr:Eu²⁺Phosphors"
 Y. Iwabuchi, N. Mori, K. Takahashi, T. Matsuda and S. Shionoya
 Jpn. J. Appl. Phys. **33** (1994) 178.



Ground plan of the basement of the UVSOR Facility



The UVSOR storage ring and the beam lines.



Intensity distribution of the UVSOR radiation.

Tabel 1. Main Parameters of UVSOR Storage Accelerator Complex

Linac

Energy	15	MeV
Frequency	2.856	GHz

Synchrotron

Energy	600	MeV
Current	32	mA
Circumference	26.6	m
Superperiodicity	6	
Bending Radius	1.8	m
Harmonic Number	8	
RF Frequency	90.115	MHz
Repetition Ratio	2.6	Hz

Storage Ring

Energy	750	MHz
Critical Energy of SR	425	eV
Beam Current (Nominal)		
Multi-bunch mode	200	mA
Single-bunch mode	60 - 70	mA
Beam Lifetime	180	min. (at I = 200 mA)
Circumference	53.2	m
Superperiodicity	4	
Bending Radius	2.2	m
Betatron Wave Numbers		
Horizontal	3.19	
Vertical	2.22	
Momentum Compaction Factor	0.032	
Radio Frequency	90.115	MHz
RF Voltage	50	kV
Natural Emittance		
Horizontal	1.15×10^{-7}	π m rad
Vertical	1.15×10^{-8}	π m rad*
Beam Sizes		
Horizontal	0.39	mm
Vertical	0.27	mm*
Bunch Length	170	psec

*10% coupling is assumed.

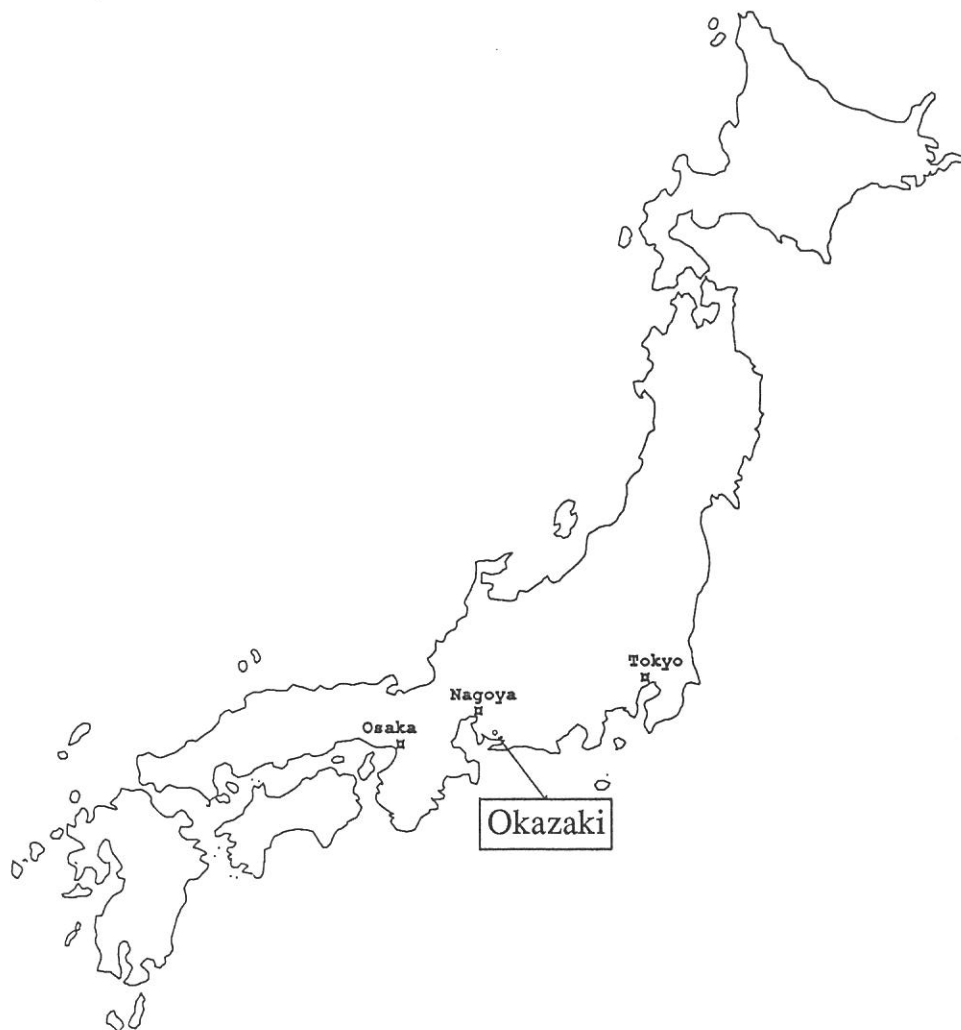
Table 2. Beam Lines at UVSOR

Beam Line	Monochromator, Spectrometer	Wavelength Region	Acceptance Angle(mrad)		Experiment
			Horiz.	Vert.	
BL1A	Double Crystal	15 - 8 Å	4	1	Solid
BL1B	1m Seya-Namioka	6500 - 300 Å	60	6	Gas &Solid
BL2A	1m Seya-Namioka	4000 - 300 Å	40	6	Gas
BL2B1	2m Grasshopper	600 - 15 Å	10	1.7	Gas & Solid
BL2B2	1m Seya-Namioka	2000 - 300 Å	20	6	Gas
BL3A1	None (Filter, Mirror)		(U) 0.3	0.3	Gas & Solid
BL3A2	2.2m Constant Deviation Grazing Incidence	1000 - 100 Å	10 (U) 0.3	4 0.3	Gas & Solid
BL4A	None		6	6	Irradiation
BL4B	None		8.3	6	Irradiation
BL3B	3m Normal Incidence	4000 - 300 Å	20	6	Gas
BL5B	Plane Grating	2000 - 20 Å	10	2.2	Calibration
BL6A1	Martin-Pupplet	5 mm - 50 µm	80	60	Solid
BL6A2	Plane Grating	6500 - 80 Å	10	6	Solid
BL6B	FT-IR	200 - 1.7 µm	70	25	Solid
BL7A	Double Crystal	15 - 8 Å	2	0.3	Solid
		15 - 2 Å	(W) 1	0.15	Solid
BL7B	1 m Seya-Namioka	6500 - 300 Å	40	8	Gas & Solid
BL8A	None (Filter)		25	8	Irradiation, User's Instrm.
BL8B1	15m-Constant Deviation Grazing Incidence	400 - 20 Å	10	1.5	Gas & Solid
BL8B2	Plane Grating	6500 - 80 Å	10	6	Solid

U: with an undulator, W: with a wiggler

LOCATION

Ultraviolet Synchrotron Orbital Radiation (UVSOR) Facility, Institute for Molecular Science (IMS) is located at Okazaki. Okazaki (population 300,000) is 260 km southwest of Tokyo, and can be reached by train in about 3 hours from Tokyo via New Tokaido Line (Shinkansen) and Meitetsu Line.



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