

C O N T E N T S

	Page
PREFACE	
GRAVURE	
FEATURE ARTICLE	
RNC's initiatives in the ImPACT program	S1
I . HIGHLIGHTS OF THE YEAR	
Investigation of a new production and separation technique for RI beams at BigRIPS, "In-separator two-step method".....	S7
H. Suzuki <i>et al.</i>	
Three quasiparticle isomers in odd-even $^{159,161}\text{Pm}$: Calling for modified spin-orbit interaction for the neutron-rich region ..	S8
R. Yokoyama <i>et al.</i>	
Pairing forces govern population of doubly magic ^{54}Ca from direct reactions.....	S9
F. Browne <i>et al.</i>	
Structure of ^{17}B studied by the quasifree neutron knockout reaction.....	S10
Z. H. Yang <i>et al.</i>	
Probing the symmetry energy with the spectral pion ratio	S11
J. Estee <i>et al.</i>	
Rapidity distributions of $Z = 1$ isotopes and the nuclear symmetry energy from $\text{Sn} + \text{Sn}$ collisions with radioactive beams at 270 MeV/nucleon.....	S12
M. Kaneko <i>et al.</i>	
Estimation of radiative half-life of $^{229\text{m}}\text{Th}$ by half-life measurement of other nuclear excited states in ^{229}Th	S13
Y. Shigekawa <i>et al.</i>	
Toward <i>ab initio</i> charge symmetry breaking in nuclear energy density functionals	S14
T. Naito <i>et al.</i>	
Total reaction cross sections in the island of inversion near $N = 40$	S15
W. Horiuchi <i>et al.</i>	
Asymmetry of antimatter in the proton.....	S16
Y. Goto <i>et al.</i>	
Gluon EMC effects in nuclear matter.....	S17
X.-G. Wang <i>et al.</i>	
Production of highly charged calcium-ion beam using high-temperature oven	S18
T. Nagatomo <i>et al.</i>	
First transport of unstable nuclei into SCRIT system	S19
Y. Abe <i>et al.</i>	
Performance study of wide dynamic range photon detection system using Ge detectors for muonic X-ray spectroscopy.....	S20
R. Mizuno <i>et al.</i>	
Development of inspection system for bus extender cable of RHIC-sPHENIX INTT detector.....	S21
H. Imai <i>et al.</i>	
Simple cubic self-assembly of PbS quantum dots by fine ligand control.....	S22
J. Liu, Y.-J. Pu <i>et al.</i>	
Co-precipitation behaviour of single atoms of rutherfordium in basic solutions	S23
Y. Kasamatsu <i>et al.</i>	
Sodium ascorbate protects ^{211}At -labeled antibodies from reactive oxygen species damage	S25
S. Manabe <i>et al.</i>	
Intratumoral administration of astatine-211-labeled gold nanoparticle for alpha therapy.....	S26
H. Kato <i>et al.</i>	
Activation cross sections of proton-induced reactions on praseodymium up to 30 MeV	S28
M. Aikawa <i>et al.</i>	
Activation cross section measurement of alpha-particle induced reactions on natural neodymium	S29
M. Sakaguchi <i>et al.</i>	

Argon-ion-induced mutations in <i>Arabidopsis EGY1</i> gene affect chloroplast development in leaf guard cells	S30
A. Sanjaya <i>et al.</i>	

II . RESEARCH ACTIVITIES I (Nuclear, Particle and Astro-Physics)

1. Nuclear Physics

RI beam production at BigRIPS in 2021	1
H. Takeda <i>et al.</i>	
Status of the mass measurement of neutron-rich nuclei at $A \sim 50$ –60 using SLOWRI/ZD-MRTOF	3
S. Imura <i>et al.</i>	
Highly precise mass measurements of neutron-rich nuclei at $A = 82$ –92 at ZeroDegree-MRTOF(ZD-MRTOF)	4
W. Xian, M. Rosenbusch <i>et al.</i>	
Mass measurements of neutron-rich nuclei around $A = 112$ with ZD-MRTOF-MS system	5
D. Hou, A. Takamine <i>et al.</i>	
Improved mass measurement of ^{257}Db by decay-correlated mass spectroscopy	6
P. Schury <i>et al.</i>	
Initial mass measurement of ^{258}Db by decay-correlated mass spectroscopy	7
P. Schury <i>et al.</i>	
Status of the study of masses and half-lives of ^{252}Cf fission fragments by the MRTOF-MS	8
S. Kimura <i>et al.</i>	
First measurement of double Gamow-Teller giant resonance at RIBF	9
A. Sakaue	
Spectroscopy of pionic atoms in tin isotopes by ($d, ^3\text{He}$) reactions	10
S. Y. Matsumoto <i>et al.</i>	
Spectroscopy of three-neutron system via the $^3\text{H}(t, ^3\text{He})3n$ reaction	11
K. Miki <i>et al.</i>	
Re-measurement of the $^4\text{He}(^6\text{He}, ^8\text{Be})$ reaction	12
S. Masuoka <i>et al.</i>	
Mass measurements of neutron-rich Ni isotopes in Rare-RI Ring II	13
A. Ozawa <i>et al.</i>	
Mass measurements with the Rare-RI ring for the $A = 130$ r -process abundance peak II	14
S. Naimi <i>et al.</i>	
Decay spectroscopy in exotic neutron-rich nuclei near the $N = 50$ shell closure	15
C. J. Griffin <i>et al.</i>	
Half-lives and β -delayed neutron emission for the most exotic neutron-rich Se and Br isotopes	16
R. Caballero-Folch <i>et al.</i>	
Identification of a new μs -isomer in the REP region	17
A. Vitéz-Sveicz, G. G. Kiss <i>et al.</i>	
RIBF181: γ -ray spectroscopy in the vicinity of ^{78}Ni	18
R. Taniuchi <i>et al.</i>	
Neutron intruder states and collectivity beyond $N = 50$ towards ^{78}Ni	19
L. Plagnol, F. Flavigny <i>et al.</i>	
Charge state separation in the ZD spectrometer for the ^{132}Sn region	20
T. Parry <i>et al.</i>	
Observation of low-lying dipole states in the $^{11}\text{Li}(p, n)$ reaction	21
L. Stuhl <i>et al.</i>	
Analysis of $^{48}\text{Cr}(p, n)$ reaction in inverse kinematics	22
M. Sasano <i>et al.</i>	
Measurement of proton elastic scattering from ^{132}Sn at 300 MeV/nucleon in inverse kinematics	23
T. Harada <i>et al.</i>	
Commissioning study of SCRIT facility with ^{138}Ba nucleus	24
K. Tsukada <i>et al.</i>	

Yield measurements for $^{86}\text{Kr} + ^{198}\text{Pt}$ at KISS	25
Y. X. Watanabe <i>et al.</i>	
In-gas-cell laser ionization spectroscopy of ^{200g}Pt using MRTOF-MS at KISS	26
Y. Hirayama <i>et al.</i>	
Isomer spectroscopy using multi-nucleon transfer reaction on ^{248}Cm	27
S. Go <i>et al.</i>	
Proton entropy excess and possible signature of pairing reentrance in hot nuclei	28
B. Dey <i>et al.</i>	
The ONOKORO project—Toward comprehensive understanding on clustering in heavy nuclei	29
T. Uesaka, J. Zenihiro <i>et al.</i>	
2. Nuclear Physics (Theory)	
Practical method for decomposing discretized breakup cross sections into components of each channel	31
S. Watanabe <i>et al.</i>	
Effects of the Skyrme tensor force on 0^+ , 2^+ , and 3^- states in ^{16}O and ^{40}Ca nuclei with second random phase approximation	32
M. J. Yang, C. L. Bai, and H. Sagawa	
On the deformability of atoms	33
T. Naito <i>et al.</i>	
Comparative study of the dineutron in Borromean nuclei ^{11}Li and ^{22}C	34
M. Yamagami	
Nuclear surface diffuseness of Ne and Mg isotopes in the island of inversion	35
V. Choudhary <i>et al.</i>	
Study of β -delayed one-neutron emission probabilities using a neural network model	36
D. Wu, C. L. Bai, H. Sagawa <i>et al.</i>	
Reentrant of the pairing gap and α -correlation in ^{108}Cd	37
K. Sugawara-Tanabe and K. Tanabe	
α -correlation in ^{108}Cd excitation energy spectrum of α removal from ^{112}Sn	38
K. Sugawara-Tanabe <i>et al.</i>	
Proof-of-principle calculations in the <i>ab initio</i> no-core Monte Carlo shell model	39
T. Abe <i>et al.</i>	
Structure of few-alpha systems in cold neutron matter	40
H. Moriya, H. Tajima <i>et al.</i>	
Second and fourth moments of the charge density and neutron-skin thickness of atomic nuclei	41
T. Naito <i>et al.</i>	
Comment on “Breakdown of the tensor component in the Skyrme energy density functional”	42
H. Sagawa, G. Colò, and L. Cao	
3. Nuclear Data	
Production of ^{93}Zr sample in the $^{93}\text{Nb}(n, p)$ reaction towards accurate determination of ^{93}Zr half-life	43
A. Takamine <i>et al.</i>	
EXFOR compilation of data from RIBF in 2021	44
T. Tada <i>et al.</i>	
4. Hadron Physics	
Simulation study of the charged current DIS cross-section measurement at the EIC	45
S. Shimizu	
Resolution studies for the ECCE EIC detector proposal	46
R. Seidl	
Design of the zero degree calorimeter for the EIC	47
S. Shimizu <i>et al.</i>	
Preparation for very-forward particle measurements in RHICf-II experiment	48
M. H. Kim	

Measurement of J/ψ and ψ' productions in $p+d$ and $p+p$ at SeaQuest K. Nakano <i>et al.</i>	49
Transverse single spin asymmetries of forward neutrons in $p+p$, $p+Al$ and $p+Au$ collisions at $\sqrt{s_{NN}} = 200$ GeV as a function of transverse and longitudinal momenta R. Seidl	50
Analysis of transverse single spin asymmetry for the forward neutron at the RHICf experiment M. H. Kim	51
Status of the J-PARC E16 experiment in 2021 S. Yokkaichi	52
Analysis of Quark-Gluon plasma properties based on jets with ALICE experimental data T. Kumaoka	53
Performance evaluation for sPHENIX-INTT ladder with a beta source Y. Namimoto <i>et al.</i>	54
5. Hadron Physics (Theory)	
6. Particle Physics	
Search for an effective change of variable in QCD simulations P. Boyle <i>et al.</i>	55
Radiative corrections to Landau levels of a single electron revisited R. Yamazaki and M. Nio	56
Quarternion-spin-isospin model Y. Akiba	57
7. Astrophysics and Astro-Glaciology	
Broad-band spectral analysis of the gamma-ray binary system LS 5039 and its strong MeV gamma-ray emission H. Yoneda <i>et al.</i>	59
8. Accelerator	
Distributed control by EPICS for the SRILAC beam energy position monitoring system using LabVIEW T. Watanabe <i>et al.</i>	61
Improvement of the transmission efficiency of RILAC T. Nishi <i>et al.</i>	62
Development of FPGA-based machine protection system for RIBF M. Komiyama <i>et al.</i>	63
Deployment of a beam interlock system driven by changes in magnet current (Curs-BIS) at the RI Beam Factory K. Kumagai and A. Uchiyama	64
2021 Operational report for the Nishina RIBF water-cooling system T. Maie <i>et al.</i>	65
Development of a new indicator for the auto tuning system with high-intensity primary beams T. Nishi <i>et al.</i>	66
Status of vacuum pumping systems in accelerator facilities Y. Watanabe <i>et al.</i>	67
9. Instrumentation	
Development of auto-focusing and auto-centering system for the BigRIPS separator (II) Y. Shimizu <i>et al.</i>	69
Development of new ionization chamber specialized in high-Z beam M. Yoshimoto <i>et al.</i>	70
Radiation transport calculation of BigRIPS separator K. Yoshida	71
Present status of beam transport line from SRC to BigRIPS K. Kusaka <i>et al.</i>	72
Development of novel semiconductor detector towards high-rate heavy RI beam counting T. Isobe <i>et al.</i>	73
A pilot experiment for collective flow in heavy-ion collisions S. Nishimura <i>et al.</i>	74

Silicon trackers for cluster knockout reactions in ONOKORO	75
K. Higuchi, J. Tanaka <i>et al.</i>	
Development of the GAGG(Ce) calorimeter for the cluster knockout reaction measurement	76
R. Tsuji <i>et al.</i>	
Development of a low-cost FPGA-Integrated TDC	77
H. Baba	
Development of a high-bandwidth waveform processing system using RFSoc	78
S. Takeshige <i>et al.</i>	
Compensation for energy-spread growth in RUNBA	79
M. Wakasugi <i>et al.</i>	
Compensation for emittance growth in RUNBA	80
M. Wakasugi <i>et al.</i>	
Simulation study to compensate for growth in energy spread and emittance in RUNBA	81
M. Wakasugi <i>et al.</i>	
Improvements in the working environment for target handling at ERIS	82
T. Ohnishi <i>et al.</i>	
Compact position-sensitive detector for in-ring diagnostics at the Rare-RI Ring	83
S. Naimi and G. Hudson-Chang	
Extraction test of photo ionized Bi in PALIS gas cell	84
T. Sonoda <i>et al.</i>	
Development of a timing detector for decay spectroscopy in conjunction with MRTOF-MS	85
M. Mukai <i>et al.</i>	
New developments and progress of the ZD-MRTOF system in 2021	86
M. Rosenbusch <i>et al.</i>	
Fifth report on offline tests for RF carpet transportation in RF ion guide gas cell at the SLOWRI facility	87
A. Takamine <i>et al.</i>	
Development of β -TOF detector for decay-correlated mass measurement of β -decaying nuclides	88
T. Niwase <i>et al.</i>	
Ion extraction from linear Paul trap via axially swinging field	89
K. Imamura <i>et al.</i>	
Offline collinear laser spectroscopy of zirconium II	90
M. Tajima <i>et al.</i>	
Fluorescence detection of the highly energetic radioactive Rb beams stopped in an optical cryostat at HIMAC	91
K. Tsubura <i>et al.</i>	
Development of dispersion matching optics in OEDO beamline	92
S. Hanai <i>et al.</i>	
Commissioning of the Si-CsI array TiNA for direct reactions at OEDO	93
B. Mauss <i>et al.</i>	
First production of ${}^6\text{He}$ beam at CRIB	94
H. Yamaguchi <i>et al.</i>	
Long polarization-maintaining fiber link (440 m) for magneto-optical trapping of francium atoms	95
K. Nakamura <i>et al.</i>	
RI nuclides produced in stacked Si and Al plates by 135-MeV/nucleon ${}^{12}\text{C}$ beam	96
T. Kambara and A. Yoshida	
Construction status of the INTT silicon tracker for sPHENIX at RHIC	97
I. Nakagawa <i>et al.</i>	
Production of bus-extender for sPHENIX INTT detector	98
T. Hachiya <i>et al.</i>	
Detection efficiency of the RHIC-sPHENIX-INTT detector	99
M. Morita <i>et al.</i>	
Test beam experiment at ELPH in Tohoku University for sPHENIX INTT	100
G. Nukazuka <i>et al.</i>	

Computing and network environment at the RIKEN Nishina Center T. Ichihara <i>et al.</i>	102
CCJ operations in 2021 S. Yokkaichi <i>et al.</i>	103

III. RESEARCH ACTIVITIES II (Material Science and Biology)

1. Atomic and Solid State Physics (Ion)

Crystal growth and β -NMR studies of the simplest copper oxide (CuO) H. Yamazaki <i>et al.</i>	105
Single-event damages on SiC junction barrier Schottky diodes M. Iwata <i>et al.</i>	106
Analysis of diffraction patterns of laser spots in dual-microbeams generated by glass capillary optics for future biological use K. Inayoshi <i>et al.</i>	107

2. Atomic and Solid State Physics (Muon)

μ SR study on the low-temperature anomaly in triangular-lattice antiferromagnet CuOHCl I. Yamauchi, X. G. Zheng, and I. Watanabe	109
Zero-field μ SR measurements to investigate the magnetic ordering of Nd ₂ Ru ₂ O ₇ U. Widyaiswari <i>et al.</i>	110
Spin dynamics of Nd ₂ Pt ₂ O ₇ at 0.3 K observed by longitudinal-field μ SR measurements U. Widyaiswari <i>et al.</i>	111
Novel quantum spin liquid state in Ba ₃ ZnRu ₂ O ₉ Y. Yasui <i>et al.</i>	112
μ^+ SR Knight shift of the Mott insulator κ -(ET) ₄ Hg _{2.78} Cl ₈ D. P. Sari <i>et al.</i>	113
μ SR study of the stabilization mechanism of antiferromagnetic state in molecular π - <i>d</i> system λ -(BEDT-STF) ₂ Fe _x Ga _{1-x} Cl ₄ S. Fukuoka <i>et al.</i>	115
μ SR study of Fe-substitution effects on ferromagnetic fluctuations in nonsuperconducting heavily overdoped Bi-2201 cuprates T. Adachi <i>et al.</i>	116
Hole-doping effect on the magnetic correlation in the undoped (Ce-free) superconductor T [*] -La _{1.8} Eu _{0.2} CuO ₄ studied by μ SR T. Kawamata <i>et al.</i>	117

3. Radiochemistry and Nuclear Chemistry

Isothermal gas chromatography study of Zr and Hf tetrachlorides using radiotracers of ⁸⁸ Zr and ¹⁷⁵ Hf—Towards investigation of gas-phase chemistry of Rf K. Shirai <i>et al.</i>	119
Online anion-exchange experiment of ^{89m} Zr in the Adogen 464/HNO ₃ system for the chemical research of Rf E. Watanabe <i>et al.</i>	120
Solvent extraction of Zr and Hf in trioctylamine/H ₂ SO ₄ system T. Yokokita and H. Haba	122
Determination of ²³⁶ U in a Th target irradiated with Li ions by ICP mass spectrometry A. Nagai <i>et al.</i>	123
Development of a photon measurement apparatus for observing the radiative decay of ^{229m} Th produced from ²²⁹ Pa Y. Shigekawa <i>et al.</i>	124
Surface ionization of protactinium toward implanting ²²⁹ Pa into a CaF ₂ crystal Y. Shigekawa and H. Haba	126
Development of RF carpet gas cell for extracting ^{229m} Th ions Y. Shigekawa <i>et al.</i>	127

Preparation of an ^{225}Ac source for ^{221}Fr EDM measurement	129
M. Sato <i>et al.</i>	
Accelerator production and chemical separation of theranostic radionuclide ^{141}Ce	130
K. Ooe <i>et al.</i>	
Production of no-carrier-added Cr radiotracers in α -particle-induced reactions on Ti target	131
T. Yokokita and H. Haba	
Production of ^{44}Ti via the $^{45}\text{Sc}(p, 2n)^{44}\text{Ti}$ reaction for $^{44}\text{Ti}/^{44\text{g}}\text{Sc}$ generator development	133
X. Yin <i>et al.</i>	
HPLC elution behavior of heavy lanthanide metallofullerene: $\text{Ln}@C_{82}$ (Tb, Dy, Ho, Er, Lu) on pyrenyl stationary phase	134
K. Akiyama <i>et al.</i>	
Ionic liquid extraction of astatine for a nuclear medical utilization	135
Y. Nagai <i>et al.</i>	
Synthesis of [^{211}At]4-astato-L-phenylalanine by dihydroxyboryl-astatine substitution reaction in aqueous solution	136
Y. Shirakami <i>et al.</i>	
Neopentyl glycol as a scaffold to provide radiohalogenated theranostic pairs of high <i>in vivo</i> stability	137
H. Suzuki <i>et al.</i>	
Treatment for peritoneal dissemination of gastric cancer using ^{211}At	138
S. Nomura and H. Haba <i>et al.</i>	
Analysis of complex formation between rhenium and various hydrophilic ligands using HPLC and preparation of ^{186}Re -carrying liposomes	139
I. O. Umeda <i>et al.</i>	
Effect of tumor size on the therapeutic effect of ^{67}Cu -labeled compounds targeting the somatostatin receptor	141
Y. Fujisawa <i>et al.</i>	
Synthesis of $^{44\text{m}}\text{Sc}$ -DOTA-TATE for multiple-isotope PET imaging	142
T. Fukuchi <i>et al.</i>	
Investigation of the usability of RIKEN $^{44\text{m}}\text{Sc}$ for radiolabeling on chelate-compounds	143
S. Oshikiri <i>et al.</i>	
Progress of double-photon coincidence imaging with ^{28}Mg	144
M. Uenomachi <i>et al.</i>	
Source preparation technique of astatine-211 without electroplating for alpha spectroscopy	145
S. Fujino <i>et al.</i>	
Production cross sections of ^{225}Ac and ^{225}Ra in the $^{232}\text{Th}(^{14}\text{N}, xny\text{p})$ reactions at 56, 79, and 98 MeV/nucleon	147
X. Yin <i>et al.</i>	
Production cross sections of ^{28}Mg via the α -particle-induced reaction on aluminum	148
M. Aikawa <i>et al.</i>	
Production cross sections of titanium radionuclides via proton-induced reactions on scandium	149
M. Aikawa <i>et al.</i>	
Production cross sections of ^{45}Ti via deuteron-induced reaction on ^{45}Sc	150
Ts. Zolbadral <i>et al.</i>	
Production cross sections of ^{47}Sc via proton-induced reactions on calcium	151
M. Aikawa <i>et al.</i>	
Production cross sections of ^{47}Sc via deuteron-induced reactions on natural calcium	152
M. Aikawa <i>et al.</i>	
Activation cross sections of alpha-particle-induced reactions on natural calcium	153
M. Aikawa <i>et al.</i>	
Activation cross sections of proton-induced reactions on manganese up to 30 MeV	154
H. Huang <i>et al.</i>	
Activation cross sections of deuteron-induced reactions on natural chromium up to 24 MeV	155
H. Huang <i>et al.</i>	
Production cross-sections of $^{52\text{m}}\text{Mn}$ in alpha-particle-induced reactions in natural vanadium	156
G. Damdinsuren <i>et al.</i>	

Measurement of production cross sections of medical isotope ^{110m}In in alpha-particle-induced reaction on natural silver up to 50 MeV	157
Ts. Zolbadral <i>et al.</i>	
Cross sections of alpha-particle-induced reactions on ^{nat}Sb	158
S. Takács <i>et al.</i>	
Activation cross sections of deuteron-induced reactions on praseodymium up to 24 MeV	159
M. Aikawa	
Production cross sections for α -particle-induced reactions on ^{nat}La	160
S. Ebata <i>et al.</i>	
Production cross sections of ^{153}Sm via alpha-particle-induced reactions on natural neodymium	161
M. Aikawa <i>et al.</i>	
Production cross-sections of dysprosium-159 radioisotope obtained by α -particle-induced reactions of natural gadolinium up to 50 MeV	162
D. Ichinkhorloo <i>et al.</i>	
Production cross-sections of holmium-161 radioisotope from alpha-particle-induced reaction on terbium-159 up to 29 MeV	163
D. Ichinkhorloo <i>et al.</i>	

4. Radiation Chemistry and Biology

Responsible gene analysis of phenotypic mutants revealed the linear energy transfer (LET)-dependent mutation spectrum in rice	165
R. Morita <i>et al.</i>	
Genetic characterization of large flower mutant <i>ohbanal</i> induced by heavy-ion beam irradiation in <i>Arabidopsis thaliana</i>	166
V. Q. Nhat <i>et al.</i>	
$^{40}\text{Ar}^{17+}$ beam-induced mutants of the mycorrhizal mushroom <i>Tricholoma matsutake</i> defective in β -1,4 endoglucanase activity better promote the <i>Pinus densiflora</i> seedling growth in vitro than the wild-type strain	167
H. Murata <i>et al.</i>	
Highly efficient and comprehensive identification of ethyl methanesulfonate-induced mutations in <i>Nicotiana tabacum</i> L. by whole-genome and whole-exome sequencing	168
H. Ichida <i>et al.</i>	
Method of chromosome observation in the dioecious plant <i>Silene latifolia</i>	169
T. Kobayashi <i>et al.</i>	
Producing high brix content of the sweet potato Anno-Beni by mutation induced using ion-beam irradiation	170
T. Hashiguchi <i>et al.</i>	
Isolation method of marine red alga <i>Agardhiella subulate</i>	171
K. Tsuneizumi <i>et al.</i>	
Survival rate of yeast cells in different storage media	172
Y. Nishimiya and H. Ichida	
Effect of irradiation ions and doses on the survival rate of yeast	173
N. Lei <i>et al.</i>	
Recruitment of Rad51 onto chromatin is suppressed by high dose heavy-ion irradiation in mammalian cells	174
M. Izumi and T. Abe	

IV. OPERATION RECORDS

Program advisory committee meetings for nuclear physics and for materials and life experiments	175
K. Yoneda <i>et al.</i>	
Electric power consumption of RIKEN Nishina Center in 2021	176
M. Kidera <i>et al.</i>	
Operation report on ring cyclotrons in the RIBF accelerator complex	177
T. Nakamura <i>et al.</i>	

RILAC operation	178
T. Ohki <i>et al.</i>	
Operation report on the RIKEN AVF cyclotron for 2021	179
S. Fukuzawa <i>et al.</i>	
Present status of liquid-helium supply and recovery system	180
T. Dantsuka <i>et al.</i>	
Impurity concentration in recovered helium gas of liquid-helium supply and recovery system	181
M. Nakamura <i>et al.</i>	
Operation of the BigRIPS cryogenic plant	182
K. Kusaka <i>et al.</i>	
Radiation safety management at RIBF	183
K. Tanaka <i>et al.</i>	
Operation of Pelletron tandem accelerator	185
T. Ikeda <i>et al.</i>	
Fee-based activities performed by the RI Application Research Group	186
A. Nambu <i>et al.</i>	

V. EVENTS

International workshops on the extension project for the J-PARC hadron experimental facility (J-PARC HEF-ex WSs)	187
F. Sakuma	
SPIN2021 international spin symposium	188
Y. Goto and T. Uesaka	
Small- <i>x</i> physics in the electron-ion collider era	189
Y. Hatta <i>et al.</i>	
RIKEN open day 2021	190
K. Tanaka <i>et al.</i>	

VI. ORGANIZATION AND ACTIVITIES OF RIKEN NISHINA CENTER

(Activities, Members, Publications & Presentations)

Organization

1. Organization Chart	191
2. Finances	192
3. Staffing	192
4. Research publication	193
5. Management	194
6. International Collaboration (as of March 31, 2022)	198
7. Awards	199
8. RIKEN Awards	200
9. Brief overview of the RI Beam Factory	201
Center Director	203

Laboratories

Nuclear Science and Transmutation Research Division

Radioactive Isotope Physics Laboratory	205
Spin isospin Laboratory	212
Nuclear Spectroscopy Laboratory	217
High Energy Astrophysics Laboratory	222
Nuclear Many-body Theory Laboratory	228
Superheavy Element Research Group	232
Superheavy Element Production Team	233

Superheavy Element Device Development Team	236
Astro-Glaciology Research Group	238
Nuclear Transmutation Data Research Group	241
Fast RI Data Team	242
Slow RI Data Team	243
Muon Data Team	244
High-Intensity Accelerator R&D Group	247
High-Gradient Cavity R&D Team	248
High-Power Target R&D Team	249
<i>Research Facility Development Division</i>	
Accelerator Group	251
Accelerator R&D Team	253
Ion Source Team	254
RILAC Team	255
Cyclotron Team	257
Beam Dynamics & Diagnostics Team	259
Cryogenic Technology Team	261
Infrastructure Management Team	262
Instrumentation Development Group	263
SLOWRI Team	265
Rare RI-ring Team	268
SCRIT Team	270
Research Instruments Group	273
BigRIPS Team	274
SAMURAI Team	277
Computing and Network Team	279
Detector Team	281
<i>Accelerator Applications Research Division</i>	
Beam Mutagenesis Group	283
Ion Beam Breeding Team	284
Plant Genome Evolution Research Team	288
RI Application Research Group	290
Nuclear Chemistry Research Team	291
Industrial Application Research Team	298
<i>Subnuclear System Research Division</i>	
Quantum Hadron Physics Laboratory	299
Strangeness Nuclear Physics Laboratory	304
Radiation Laboratory	307
Meson Science Laboratory	312
RIKEN BNL Research Center	317
Theory Group	319
Experimental Group	323
Computing Group	328
RIKEN Facility Office at RAL	333

Safety Management Group	337
User Liaison Group	339
RIBF User Liaison Team	340
Outreach Team	341
Office of the Center Director	342
Partner Institutions	345
Center for Nuclear Study, Graduate School of Science, The University of Tokyo	346
Wako Nuclear Science Center, IPNS (Institute of Particle and Nuclear Studies), KEK (High Energy Accelerator Research Organization)	354

VII. APPENDICES

Symposia, Workshops & Seminars	357
Events	364
Press Releases	365
Preprints	366