



Table of Contents

Acknowledgments.....	VIII
Program	X
Introduction - F. Helus	XIII
First Session:	
Accelerators and Targets, Users' Experience, New Facilities, Report from the Labs	
The GE ¹⁸F-Fluoride High Yield Target	2
J.O. Bergström, T. Eriksson, P. Wiberg	
Improvement of Fluoride-18 Production in IBA Targets.....	4
M. Ghyoot, F. Schmitz, R. Verbruggen, P.E. Boeyen, E. Mishani, G. Bormans	
Evaluation of the GE PETtrace™ Radio Tracer Production System	7
M.J. Welch, J.C. Clark, T. Ido	
RDS-111 Targetry (Talk only).....	8
B. Alvord	
The No.1 Machine in Berkeley (Talk only).....	9
J. O'Neil	
CYCLONE 18/9 User Community.....	12
S. Preusche, J. Steinbach, F. Füchtner	
Selection of the Optimal Cyclotron (Talk only).....	14
M. Jensen	
Introduction to Session Ib:	
New Facilities and Reports from the Labs	17
J. Clark	
New Approaches to the Control of Accelerators and Production Systems	18
G.G. Gaehle, M.J. Welch	
Using the PULSAR™ PL-7 RF Proton Linac for F-18 Production	20
G.D. Robinson, Jr., R.W. Hamm	
Fully Automated and Unattended [¹⁸F]Fluoride and [¹⁸F]FDG Production Using PLC Controlled Systems.....	23
J. Medema, G. Luurtsema, H. Keizer, S. Tilkema, P.H. Elsinga, E.J.F. Franssen, A.M.J. Paans, W. Vaalburg	
Maintenance and Quality Assurance of a Bed-Side [¹⁵O]water Infuser	26
N. Steel, D. Fahy, J.C. Clark, K. Dowsett	
A Versatile ¹⁵O-Water Infusor	29
G. Westera, P.A. Schubiger, R. Schwarzbach	



Report from Bukarest (Talk only)	30
L. Popa-Simil	
Report from Damascus (Talk only)	32
A.H. Al Rayyes	
Experience in the Long-term Regular Production of High Quality PET Gases with the Cyclone 3D ¹⁵O Generator	33
D.B. Mackay, C.J. Steel, N. Steel, K. Poole, S. McKnight, J.C. Clark, F. Schmitz	
Production of Radionuclides for Medical Purposes by the VINCY Cyclotron	35
J.J. Comor, M. Zupancic, L. Vuksanovic, J. Vucina, T. Trtic	
Routine Production of [¹⁸F]FDOPA by Automated Synthesis System	37
K. Hatano, Y. Kawasumi, K. Ito, T. Kato, Y. Sakiyama	
High Yield Preparation of 6-[¹⁸F]Fluoro-DOPA	39
F. Füchtner, J. Steinbach, B. Johannsen, K. Günther	
Production of 16α-[¹⁸F]Fluoroestradiol in an Automated Module	41
J. Römer, F. Füchtner, J. Steinbach	
PET Radioisotope Production with the NEC 9SDH Tandem Accelerator	42
A.D. Roberts, R.J. Nickles, R.J. Davidson	
Report on the Low Energy Accelerator Facility (LEAF) (Talk only)	43
D. Schlyer	
A U. S. Department of Energy Virtual Isotope Center	44
D. Phillips, E. Peterson, T.J. Ruth, L. Mausner	
V-48 Transmission Source Production	46
R.D. Hichwa, G.L. Watkins, L.L. Boles Ponto, M. Aykac, D. Bilgen	
International Nuclear Target Development Society (Talk only)	46
W. Lozowski	
Germanium-68 Problem Progress	48
A.A. Razbash, Yu.G. Sevastianov, Yu.V. Tolstouhov, V.E. Pavlikhin, A.I. Leonov, N.N. Krasnov, M.A. Kozlova, G.E. Kodina, A.B. Malinin	
Design and Operation of a Krypton-82 Gas Target	51
R.G. Hammond, M.L. Renton, D.B. Mackay, S.L. Waters	
Ten Years Experience with a Heavily Used Target for the Production of [¹⁸F]Fluoride	55
C.J. Steel, K. Dowsett, V.W. Pike, J.C. Clark	
A Semi-Automated System for Optimizing the Recovery of Aqueous [¹⁸F]Fluoride from Target	60
C. Pascali, A. Bogni, F. Remonti, D. Decise, G. Cucchetti, V. de Sanctis, M. Schiavini, F. Crippa, C. Chiesa, E. Bombardieri	



Second Session: High Beam Currents, In-Target Production of Precursors

Ebco Target Design (Talk only)	65
K. Erdman	
Heat Transfer Problems (Talk only).....	66
J.-L. Morelle	
Experience with Curved Natural Bismuth Internal Targets for Production of Astatine-211 via the $^{209}\text{Bi}(\alpha, 2n)^{211}\text{At}$ Reaction	70
B.W. Wieland, B.W. Schoultz, R.H. Larsen, M.R. Zalutsky	
Methane Production in Small Volume High Pressure Gas Targets	75
K.R. Buckley, J. Huser, S. Jivan, R. McDonald, T.J. Ruth	
Remote Controlled In-Target Production of ^{13}NAmmonia Using a Circulating Target	80
J. Medema, P.H. Elsinga, H. Keizer, E.J.F. Franssen, W. Vaalburg	
^3He RFQ and Unique Targetry Problems (Talk only)	83
J. Link	
High Current Experience from Hammersmith (Talk only)	86
A. Roberts	
Thermal Modeling (Talk only)	87
D. Schlyer	
Special Targets at University of Wisconsin (Talk only).....	88
R.J. Nickles	

Third Session: Target Chemistry and Radiochemistry, Plasma Effects, Specific Radioactivity

Surface-Sensitive Analysis of Materials Used in ^{18}FElectrophilic Fluorine Production.....	92
C.W. Alvord, S. Cristy, H. Meyer, N. Satyamurthy, G.T. Bida	
Fluorine Production with the Two Shoot Method (Talk only).....	99
A. Roberts	
Carbon Dioxide Adsorption on Aluminum (Talk only).....	100
R. Ferrieri	
N-13 Ammonia Production in a Cryogenic Target (Talk only).....	102
D. Schlyer	
^{13}N Production from $^{13}\text{C-CO}_2$ (Talk only)	102
J. Bida	
Multi-particle Bombardment and In-target Chemistry of Porous Carbon Materials.....	104
C.W. Alvord, G.T. Bida, B.W. Wieland, E.M. Zippi	
Decomposition of Carbon-Rich Target Materials	112
R. May, M.Hoffmeyer, E.M. Zippi, C.W. Alvord, G.T. Bida	



Quartz Micro-Fiber Target for Production of O-15 Ozone for Pulmonary Applications	114
B.W. Wieland, M.L. Russell, W.L. Dunn, G.T. Bida	
New Strategies in Designing Ultra-Microscale Syntheses	120
R.A. Ferrieri, I. Garcia, J.S. Fowler, A.P. Wolf	
Gas Phase Methyl Iodide Production (Talk only)	121
J. Link	
Recirculating Methyl Iodide System (Talk only)	123
T.J. Ruth	
Methyl Iodide – Conventional Method (Talk only)	126
R. Ferrieri	
Production of High Specific Activity [C-11]Methyl Iodide Using the GE MicroLab®	128
S. Fallis, T.J. McCarthy, M.J. Welch	
Comments on the GE Methyl Iodide Box (Talk only)	130
M. Orbe	
High Specific Activity 1-[¹¹C]Ethyl Iodide	133
C.S. Dence, M.J. Welch	
Synthesis of [¹¹C]Acetone	134
S. Fallis, T.J. McCarthy, M.J. Welch	
A New Production Method for [¹¹C]CO: Reduction of Target-produced [¹¹C]CO₂ with Molybdenum	137
S.K. Zeisler, M. Nader, A. Theobald, F. Oberdorfer	

Fourth Session: Radionuclides, Targets, Processing and Automation

<u>Invited Talk:</u> Surface Modification by Ion Beam Assisted Deposition	141
Prof. G.K. Wolf	
Introduction to Session IVa:	
Particle Beam Penetration in Nitrogen-Gas and Water Targets	155
S.-J. Heselius	
Spectroscopy of a High Purity Nitrogen Target during Irradiation (Talk only)	161
O. Solin	
Glass Target for Production of [¹³N]NH₃ from Methane	163
P. Mikecz, M.G. Dodd, F. Chaloner, P.F. Sharp	
Production of ¹²³I by Photonuclear Reactions on Xenon at Linac LUE-40 of FLNP JINR	166
V.A. Khalkin, Yu.V. Narseev, L.N. Somov, V.J. Luschikov, V.G. Pjataev, V.T. Rudenko, N.G. Zaitseva, O.K. Koljaskin	
¹⁸O Water Recovery and Purification (Talk only)	167
R. Ferrieri	
Ion Exchange Columns and Cartridges (Talk only)	170
G. Firnau	



Dimensioning of Transport Lines (Talk only)	172
R. Hichwa	
The Rossendorf Radionuclide Transport System for Gases and Liquids	175
S. Preusche, F. Füchtner, J. Steinbach, H. Krug, W. Neumann	
Long Distance Transport of [¹⁸F]F₂	177
F. Füchtner, J. Steinbach, S. Preusche	
Diffusion Based Separation Methods in Production of Non-Conventional Positron Emitters	179
T.V. Tolmachev , H. Lundqvist, L. Einarsson	
Introduction to Session IVb:	
Radionuclides, Target, Processing and Automation	182
N.G. Stevenson	
Improved Target Systems for Irradiation of Solids and Gases	184
G. Blessing, F.-O. Denzler, S.M. Qaim	
Solid Target for the Production of Radioiodines from Tellurium Oxide	186
W.Z. Gelbart, T.J. Ruth, N.R. Stevenson	
High Current Encapsulated Target and Target System for Radioisotope Production	190
W.Z. Gelbart, N.R. Stevenson, W. Ho, S. Bakhtiari	
Development of Target Chemistry for Long-Lived Radioisotopes	195
S.N. Dmitriev, N.G. Zaitseva, G.Y. Starodub, O.D. Maslov, S.V. Shishkin, T.V. Shishkina, G.V. Buklanov, A.V. Sabelnikov	
The Target for Production of High-Purity ²³⁶Pu in ²³⁷Np(g,n) Reaction	197
O.D. Maslov, S.N. Dmitriev, A.V. Sabelnikov, A.G. Belov	
Production of ¹³⁹Ce by Bombardment of a Praseodymium Target with 66 MeV Protons	199
F.M. Nortier, F.J. Haasbroek, S.J. Mills, G.F. Steyn, T.N. van der Walt	
Automated Solid Targets and Processing Systems for the Production of Intermediate-Lived Radionuclides	200
R.E. Shefer, R.E. Klinkowstein, B.J. Hughey, N.A. Fried, D.W. McCarthy, S.W. Schwarz, C.J. Anderson, M.J. Welch	
The Efficient Production of Various Positron Copper Radionuclides	203
D.W. McCarthy, W.H. Margenau, T.A. Perkins, L.A. Bass, M.J. Welch, R.E. Shefer, R.E. Klinkowstein	
An Inductive Heater for the Rapid Combustion of Graphite Disks	205
T.J. McCarthy, G.G. Gaehle, W.H. Margenau and K. Gurleyik	
Co-Production of High Specific Activity ⁶⁴Cu from ⁶⁷Ga Production Waste	206
S.V. Smith, D.J. Waters, N. Di Bartolo	
Production of ⁷²Se to Support a Clinical ⁷²As Generator for PET	208
D.R. Phillips, V.T. Hamilton, W.A. Taylor, D.J. Jamriska, R.C. Heaton, J.G. Garcia, M.A. Ott, B.L. Zhuikov, V.M. Kokhanyuk, N.A. Konyakhin, V.L. Kravchuk	



Production and Recovery of ^{109}Cd from Metallic Indium Targets	210
B.L. Zhuikov, V.M. Kokhanyuk, V.L. Kravchuk, D.R. Phillips, W.A. Taylor, R.C. Heaton	

Routine Production of ^{76}Br at a Low-Energy Cyclotron	214
V. Tolmachev H. Lundqvist, L. Einarsson, J. Schultz, B. Långström	

Production and Applications of ^{55}Co in PET	217
P. Goethals, J. Sambre, A. Volkaert, R. Dams	

Fifth Session:

Production Targets for the Medical Radionuclides, Analytical Methods

Introduction to Session V:

Typical Production Targets, Target Chemistry and Target Survey Results	221
J.R. Dahl	

Comparison of Different Target Surface Materials for the Production of Carrier-free ^{18}FFluoride.....	223
S.K. Zeisler, F. Helus, H. Gasper	

A Simple Heat Transfer Model of a Closed, Small-Volume, ^{18}O Water Target	226
R.A. Pavan, M. Cackette, R.R. Johnson	

Experience with a High Pressure Silver Water Target System for ^{18}FFluoride Production	232
J.P. O'Neil, S.M. Hanrahan, H.F. VanBrocklin	

Routine Production of ^{18}FFluoride with a High Pressure Disposable ^{18}OWater target.....	234
C.E. Gonzales-Lepera	

Comment on Silver Targets (Talk only).....	238
O. Solin	

High Pressure Silver Body Targets (Talk only).....	238
A. Roberts	

Heat Transport (Talk only)	239
D. Schlyer	

Heat Transfer by Convection (Talk only).....	240
J. Steinbach	

Home-Made Routinely Used Targets for the Production of PET Radionuclides	241
H.J. Helmeke, T. Harms, W.H. Knapp	

FDG PETtrace MicroLab[®]: Average ^{18}FFDG EOS Activity Compared to the Source of the ^{18}OWater Used.....	246
S.W. Schwarz, T.J. McCarthy, N.King, K.R. Lechner, W.H. Margenau, D.C. Ficke, B.Courtney, M.J. Welch	

Cross-Sections for the $^{11}\text{B}(\text{p},\text{n})^{11}\text{C}$ and the $^{11}\text{B}(\text{d},\text{n})^{11}\text{C}$ Nuclear Reactions	250
M.L. Firouzbakht, D.J. Schlyer, A.P. Wolf	



Poster Discussion:

Yields and Impurities in Several Production Reactions for ^{124}I.....	253
E.J. Knust, R. Weinreich	
^{18}F Fluoride Production (Talk only)	262
B. Mock	
Impurities in the Production of Fluoride for FDG (Talk only)	263
J.-L. Morelle	
A New Radiation Detector (Talk only)	266
E. Carroll	
A New High Current Spherical Target Design for $^{18}\text{O}(\text{p},\text{n})^{18}\text{F}$ with 18 MeV Protons.....	268
D.W. Becker, D. Erbe	
A New Target Changer for the DKFZ MC-32 Cyclotron	270
S.K. Zeisler, F. Helus, H. Gasper, W. Obers, H. Rühle	
 Closing Remarks - T.J. Ruth	 271
List of Participants.....	274