

CONTENTS

Session I. μ CF Experiments

Experimental Results in Muon-Catalyzed Fusion	S.E.Jones	3
Reports on UTMSL-RIKEN Collaboration on Muon Catalyzed Fusion Experiments	K.Nagamine, T.Matsuzaki, K.Ishida	23

Session II. μ CF Theory

Present Status of μ CF Theory	M.Leon	35
Coupled-Rearrangement-Channel Approach to μ CF Problems	M.Kamimura	57
Muonic Three-Body Problem and Muon-Catalyzed Fusion	Y.Akaishi	62
Theoretical Study of the Sticking Probability in the Muon Catalyzed d-t Fusion	N.Takigawa	66
Bound and Resonance States of Muonic Molecules and Cold Fusion in Hydrogen Isotopes	I.Shimamura	69
μ CF Studies in University of Tsukuba	T.Ishihara, N.Toshima, S.Hara	73
Muonic Molecule Formation Mechanism	K.Fukushima	76

Session III. Cold Fusion

Anomalous Neutron Emission in Metal-Deuterium Systems	S.E.Jones	83
A Proposal of a Cold Fusion Experiment at Kamioka	Y.Totsuka	94
Fracto-Fusion as a Mechanism of Cold Fusion	T.Takeda, T.Takizuka	107

Session IV. μ CF Related Topics and Future of μ CF

Bound Muon Decay and Muon Capture in Deuteron	M.Morita	115
Chemical Behavior of Helium Muonide	K.Yoshihara	118
On Application of Muon Catalyzed Fusion	T.Takeda	123
Some Tips on Fuel Technology Issues in Muon Catalyzed Fusion	S.Konishi	129

Appendix I. Publications of K.Nagamine

K.Nagamine, T.Matsuzaki, K.Ishida, Y.Hirata, Y.Watanabe, R.Kadono, Y.Miyake, K.Nishiyama, S.E.Jones, H.R.Maltrud: "Muonic X-Ray Measurement on the μ^- Sticking Probability for Muon Catalyzed Fusion in Liquid d-t Mixture" , Muon Catalyzed Fusion, <u>1</u> , 137 (1987)		135
K.Nagamine, T.Matsuzaki, K.Ishida: "The UT-MSL X-Ray Experiment on α^- -Sticking Probability for Muon-Catalyzed Fusion in Liquid D ₂ /T ₂ with High T ₂ -Concentration" , Muon Catalyzed Fusion, <u>2</u> , 73 (1988)		149

T. Matsuzaki, K. Ishida, K. Nagamine, Y. Hirata, R. Kadono: "Observation of Radiative Transition Photons in the μ^- Transfer Process for Liquid D ₂ with ⁴ He Impurity" , Muon Catalyzed Fusion, <u>2</u> , 217 (1988)	161
K. Nagamine, T. Matsuzaki, K. Ishida, Y. Watanabe, S. Sakamoto, M. Iwasaki, Y. Miyake, K. Nishiyama, E. Torikai, H. Kurihara, H. Kudo, M. Tanase, M. Kato, K. Kurosawa, M. Sugai, M. Fujie, H. Umezawa: "X-Ray Observation of α -Sticking Phenomena in Muon Catalyzed Fusion for High Density D-T Mixture with High T ₂ Concentration" , Proc. Int. Symp. on μ CF-89, Oxford, p.27 (1989)	174
K. Nagamine: "Muon Catalyzed Fusion: Basic Understandings and Application" , Proc. Int. Symp. Advanced Nuclear Energy, JAERI-Report, Tokyo, p.265 (1989)	183
K. Nagamine: "Ultra-slow Negative Muon Production via Muon Catalyzed Fusion" , Proc. Japan Acad., Ser.B, <u>65</u> , 225 (1989).....	194

Appendix II. Publications of M.Kamimura

M. Kamimura: "Effect of Exit-Channel Nuclear Interaction on Muon Sticking in Muon Catalyzed d-t Fusion" , Muon Catalyzed Fusion, <u>1</u> , 333 (1987)	201
M. Kamimura: "Non-Adiabatic Coupled-Rearrangement-Channels Approach to Muonic Molecules and Muon Transfer Reactions" , Muon Catalyzed Fusion, <u>3</u> , 335 (1988).....	209
M. Kamimura: "Effect of Nuclear Interaction on Muon Sticking to Helium in Muon Catalyzed d-t Fusion" , AIP Conf. Proceedings <u>181</u> , Muon Catalyzed Fusion, Florida, 1988	219
M. Kamimura: "Nonadiabatic Coupled-Rearrangement-Channel Approach to Muonic Molecules" , Phys. Rev.A, <u>38</u> , 621 (1988)	233
Y. Fukushima, M. Yahiro, M. Kamimura: "Deuteron Polarization by Muon in ($d\mu$) Atom and ($dt\mu$) Molecule" , Proc. Int. Symp. on μ CF-89, Oxford, p.59 (1989)	237

Appendix III. Publications of Y.Akaishi

M. Teshigawara, T. Katayama, Y. Akaishi, H. Tanaka: "Intermolecular and Internuclear Effective Potentials for the ($dt\mu$) Molecule" , Muon Catalyzed Fusion, <u>1</u> , 267 (1987)	245
勅使川原 学, 赤石義紀: "ミューオン触媒核融合 I - 分子内核融合機構" , 原子力学会北海道支部第 6 回研究発表会講演要旨集, 札幌, (1988).....	254
Khin Swe Myint, Y. Akaishi: "Energy of the Shallowest Level of $dt\mu$ " , 原子力学会北海道支部第 6 回研究発表会講演要旨集, 札幌, (1988).....	256

Y.Akaishi,M.Kamimura,H.Narumi: "Muonic Three-Body Problem and Muon-Catalyzed Fusion" , Z. Phys.A-Atomic Nuclei, <u>328</u> , 115 (1987)	258
Khin Swe Myint,Y.Akaishi,H.Tanaka,M.Kamimura,H.Narumi: "Relativistic and QED Contributions to the Coulomb Three-Body System in Muon-Catalyzed Fusion" , Z. Phys.A-Atomic Nuclei, (in press)	261

Appendix IV. Publications of N.Takigawa

B.Müller,N.Takigawa: "How Adiabatic is Quantum Tunneling?" , Ann. Phys., <u>173</u> , 163 (1987)	279
N.Takigawa,B.Müller: "Effects of Muon Lag on the Sticking Probability in Muon Catalyzed d-t Fusion" , Muon Catalyzed Fusion, <u>1</u> , 341 (1987)	301
N.Takigawa,B.Müller,D.Harley: "Finite Size Effects on the Stopping Power of Muonic Helium" , Proc. Int. Symp. on μ CF-89, Oxford, p.86 (1989)	309

Appendix V. Publications of I.Shimamura

I.Shimamura: "Intramolecular Nuclear Fusion in Hydrogen-Isotope Molecules" , Prog. Theor. Phys., <u>82</u> , 304 (1989)	315
島村 勲: "水素分子同位体での分子内常温核融合" , 核融合炉, No.22, 63 (1989)	326
I.Shimamura: "Series of Resonance States of Muonic Molecules" , Phys. Rev.A, <u>40</u> , 4863 (1989)	330

Appendix VI. Publications of T.Ishihara

S.Hara,T.Ishihara,N.Toshima: "Variational Calculation for Muonic Molecules" , J. Phys. Soc. Jpn., <u>55</u> , 3293 (1986)	341
S.Hara,T.Ishihara,N.Toshima: "Bound States of Muonic Molecules" , Muon Catalyzed Fusion, <u>1</u> , 277 (1987)	343
K.Kobayashi,T.Ishihara,N.Toshima: "Muon Transfer between Hydrogen Ions at Low Energies" , Muon Catalyzed Fusion, <u>2</u> , 191 (1988)	349
S.Hara,H.Fukuda,T.Ishihara,A.V.Matveenko: "Hyper-Radial Adiabatic Expansion for a Muonic Molecule $d\mu$ " , Phys. Lett.A, <u>130</u> , 22 (1988)	356
S.Hara,T.Ishihara: "X-Ray Spectrum due to the Deexcitation of a Muonic Molecule $p\alpha\mu$ " , Phys. Rev.A, <u>39</u> , 5633 (1989)	360
S.Hara,T.Ishihara: "Bound and Resonant States of Muonic Molecules below the n=2 Level of Muonic Atoms" , Phys. Rev.A, . (in press)	364
H.Fukuda,T.Ishihara,S.Hara: "Hyper-Radial Adiabatic Treatment of $d\mu + t$ Collisions at Low Energies" , Phys. Rev.A, (in press)	365

Appendix VII. Publications of K.Fukushima

K.Fukushima,F.Iseki: "Formation Rate of Muonic Molecules in an Alloy of Deuterium and Tritium" , Muon Catalyzed Fusion, <u>1</u> , 225 (1987)	369
K.Fukushima,F.Iseki: "Formation Rate of Muonic Molecules in an Alloy of Deuterium and Tritium" , Phys. Rev.B, <u>38</u> , 3028 (1988)	374
K.Fukushima: "Below-Threshold Formation of Muonic Molecule $dt\mu$ - Solid Hydrogen Case " , Proc. Int. Symp. on μ CF-89, Oxford, p.62 (1989).....	383

Appendix VIII. Publications of K.Yoshihara

K.Yoshihara: "Is Hot Atom Chemical Consideration Necessary in Muon Catalyzed Fusion? " , J. Radioanal. Nucl. Chem. Lett. <u>119</u> , 247 (1987)	395
K.Yoshihara,T.Sekine: "Muon Transfer Induced by Collisional Excitation of Helium Muonide $He\mu^+$ after Muon Catalyzed Fusion" , J. Radioanal. Nucl. Chem. Lett. <u>128</u> , 53 (1988)	403

Appendix IX. Publication of T.Takeda

T.Takeda,T.Takizuka: "Fractofusion Mechanism" , J. Phys. Soc. Jpn., <u>58</u> , 3073 (1989)	413
---	-----

Appendix X. Publications of M.Morita

K.Koshigiri,H.Ohtsubo,M.Morita: "Muon Capture in ^{11}B Muonic Atom and Hyperfine Spin Dependence " , Prog. Theor. Phys., <u>71</u> , 1293 (1984)	419
K.Koshigiri,Y.Kakudo,H.Ohtsubo,M.Morita: "Muon Capture in Complex Nuclei of Nonzero Spin" , Prog. Theor. Phys., <u>74</u> , 736 (1985)	429
M.Morita: "Muon Capture in Hyperfine States of Muonic Atoms" , Proc. 10th Int. Conf. on Atomic Physics, Tokyo,(1986)	443
R.Watanabe,M.Fukui,H.Ohtsubo,M.Morita: "Angular Distribution of Electrons in Bound Muon Decay" , Prog. Theor. Phys., <u>78</u> , 114 (1987)	460
M.Fukui,K.Koshigiri,T.Sato,H.Ohtsubo,M.Morita: "Polarizations of ^{12}B in Muon Capture Reaction with Higher Order Configuration Mixing" , Prog. Theor. Phys., <u>78</u> , 343 (1987)	469
M.Doit,T.Sato,H.Ohtsubo,M.Morita: "Effect of Meson Exchange Current on Deuteron Muon Capture" , Nucl. Phys., (in press)	484