

Second Workshop on Physics Potential and Development of $\mu^+\mu^-$ Colliders

Sausalito, California, USA 17 – 19 November 1994

EDITOR

ÖæãÁÖÖ|ã ^

AIP
American Institute
of Physics

GU gU]lc, 7 U]zfb]U,i G5 "% - (
AIP | CONFERENCE PROCEEDINGS ■ ') &

Authorization to photocopy items for internal or personal use, beyond the free copying permitted under the 1978 U.S. Copyright Law (see statement below), is granted by the American Institute of Physics for users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$30.00 per copy is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923, USA: <http://www.copyright.com>. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Services is: 978-1-56398-506-7/94/\$30.00.

© 1998 American Institute of Physics

No claim is made to original U.S. Government works.

Permission is granted to quote from the AIP Conference Proceedings with the customary acknowledgment of the source. Republication of an article or portions thereof (e.g., extensive excerpts, figures, tables, etc.) in original form or in translation, as well as other types of reuse (e.g., in course packs) require formal permission from AIP and may be subject to fees. As a courtesy, the author of the original proceedings article should be informed of any request for republication/reuse. Permission may be obtained online using RightsLink. Locate the article online at <http://proceedings.aip.org>, then simply click on the RightsLink icon/“Permissions/Reprints” link found in the article abstract. You may also address requests to: AIP Office of Rights and Permissions, Suite 1N01, 2 Huntington Quadrangle, Melville, NY 11747-4502, USA; Fax: 516-576-2450; Tel.: 516-576-2268; E-mail: rights@aip.org.

ISBN 978-1-56398-506-7 (Original Print)

ISSN 0094-243X

Printed in the United States of America

TABLE OF CONTENTS

Some Comments on the Early History of the $\mu^+ \mu^-$ Concept and the High Intensity μ Storage Ring	3
<i>D.B. Cline</i>	
Ionization Cooling: Physics and Applications	7
<i>V.V. Parkhomchuk, A.N. Skrinsky</i>	
A Muon Storage Ring for Neutrino Oscillations Experiments	10
<i>D. Cline, D. Neuffer</i>	
Principles and Applications of Muon Cooling	12
<i>D. Neuffer</i>	
Physics Potential of a Few Hundred GeV $\mu^+ \mu^-$ Collider	19
<i>D.B. Cline</i>	
$\mu^+ \mu^-$ Colliders: Possibilities and Challenges	22
<i>D.V. Neuffer</i>	
Characteristics of a High Energy $\mu^+ \mu^-$ Collider Based on Electro-Production of Muons	31
<i>W.A. Barletta, A.M. Sessler</i>	
A Muon Collider Scenario Based on Stochastic Cooling	40
<i>A.G. Ruggiero</i>	
Critical Issues in Low Energy Muon Colliders - a Summary	48
<i>S. Chattopadhyay, W. Barletta, S. Maury, D. Neuffer, A. Ruggiero, A. Sessler</i>	
Physics Goals of a $\mu^+ \mu^-$ Collider	55
<i>V. Barger, M.S. Berger, K. Fujii, J.F. Guion, T. Han, C. Heusch, W. Hong, S.K. Oh, Z. Parsa, S. Rajpoot, R. Thun, B. Willis</i>	
Physics Potential and Development of $\mu^+ \mu^-$ Colliders	70
<i>D.B. Cline</i>	
Progress Toward a High-Energy, High-Luminosity $\mu^+ \mu^-$ Collider	93
<i>D.V. Neuffer, R.B. Palmer</i>	
Monte Carlo Simulations of Muon Production	108
<i>R.B. Palmer, J.C. Gallardo, R.C. Fernow, Y. Torun, D. Neuffer, D. Winn</i>	
Comparison of the Wang and Waschmuth Models for π Production with Measurements at 12 GeV/c	125
<i>R.C. Fernow</i>	
Targets and Magnetic Elements for Pion Collection in Muon Collider Drivers	134
<i>R.C. Fernow, J. Gallardo, Y.Y. Lee, D. Neuffer, R.B. Palmer, Y. Torun, D.R. Winn</i>	
Muon Cooling and Acceleration Experiment using Muon Sources at TRIUMF	146
<i>P.H. Sandler, S.A. Bogacz, D.B. Cline</i>	
A Possible Ionization Cooling Experiment at the AGS	155
<i>R.C. Fernow, J.C. Gallardo, R.B. Palmer, D.R. Winn, D.V. Neuffer</i>	
Validity of the Differential Equations for Ionization Cooling	170
<i>R.C. Fernow, J.C. Gallardo</i>	
Backgrounds and Detector Performance at a 2 x 2 TeV $\mu^+ \mu^-$ Collider	178
<i>G.W. Foster, N.V. Mokhov</i>	
Detectors and Backgrounds for a Muon-Muon Collider. Working Group Report	191
<i>D.J. Miller</i>	
Measurements of Dynamic Aperture in LEP	198
<i>F. Ruggiero</i>	
Summary of the 200x200 GeV $\mu^+ \mu^-$ Collider Working Group	204
<i>D. Neuffer, D. Whittum, P. Bombade, D. Cline, G. Jackson, P. McIntyre, G. Peters, M. Sasaki, D. Summers, K. Yokoya</i>	
A Practical High-Energy High-Luminosity $\mu^+ \mu^-$ Collider	208
<i>R.B. Palmer, D.V. Neuffer, J. Gallardo</i>	
Physics with Like-Sign Muon Beams in a TeV Muon Collider	219
<i>C.A. Heusch, F. Cuyper</i>	
Overview of $\mu^+ \mu^-$ Collider Options	232
<i>D.B. Cline</i>	
Author Index	