

XI. ACKNOWLEDGMENTS

This research was supported by the U.S. Department of Energy under Contracts No. DE-AC02-98CH10886, DE-AC02-76CH03000 and DE-AC03-76SF00098.

- [1] M. Tigner, *Imperatives for Future High Energy Accelerators*, AIP Conf. Proc. **279**, p. 1 (1993).
- [2] G. I. Budker, *Accelerators and Colliding Beams* (in Russian), in *Proc. 7th Int. Conf. on High Energy Accel.* (Yerevan, 1969), p. 33; extract: AIP Conf. Proc. **352**, p. 4 (1996).
- [3] G. I. Budker, Int. High Energy Conf. (Kiev, 1970), unpublished; extract: AIP Conf. Proc. **352**, p. 4 (1996).
- [4] A. N. Skrinsky, *Towards Ultimate Luminosity Polarized Muon Collider (Problems and Prospects)*, AIP Conf. Proc. **441**, p. 249 (1998).
- [5] B. J. King, *Discussion on Muon Collider Parameters at Center of Mass Energies from 0.1 TeV to 100 TeV*, BNL-CAP-223-MUON-98C; to appear in Proc. EPAC98 Conf. (Stockholm, June 1998).
- [6] V. Bharadwaj, et al., *Fermilab Collider Run 1b Accelerator Performance*, Fermilab-TM-1970, (1995). See in particular Chapter 4, Table I (page 12) and Figure 8 (page 19);
<http://fnalpubs.fnal.gov/archive/1996/tm/TM-1970.html>
- [7] M. D. Church and J. P. Marriner, *The Antiproton Sources: Design and Operation* Annu. Rev. Nucl. Sci., **43**, p. 253 (1993)
- [8] A. A. Kolomensky, *On the Oscillation Decrement in Accelerators in the Presence of Arbitrary Energy Losses*, Sov. Atomic Energy **19**, p. 1511 (1965);
<http://puhep1.princeton.edu/mumu/physics/kolomensky/1.html>
- [9] G. I. Budker, *An Effective Method of Damping Particle Oscillations in Proton and Antiproton Storage Rings*, Sov. Atomic Energy **22**, p. 438 (1967);
<http://puhep1.princeton.edu/mumu/physics/budker/1.html>
- [10] Yu. M. Ado and V. I. Balbekov, *Use of Ionization Friction in the Storage of Heavy Particles*, Sov. Atomic Energy **31**, p. 731 (1971);
<http://puhep1.princeton.edu/mumu/physics/ado/1.html>
- [11] V. I. Balbekov, *Achievable Transverse Emittance of Beam in Muon Collider*, AIP Conf. Proc. **372**, p. 140 (1996);
<ftp://ftp.mumu.bnl.gov/pub/documents/balbekov.ps>
- [12] Rajendran Raja and Alvin Tollestrup, *Calibrating the energy of a 50 × 50 GeV Muon Collider using g – 2 spin precession*, Phys. Rev. D **58**, 013005 (1998);
<http://xxx.lanl.gov/ps/hep-ex/9801004>
- [13] D. Neuffer, *Multi-TeV Muon Colliders*, AIP Conf. Proc. **156**, p. 201 (1987);
<http://www-ppd.fnal.gov/muscan/munotes/mc-006.pdf>
- [14] S. Geer, *Workshop on physics at the first muon collider and front end of a muon collider: A brief summary*, in Ref. [40], p. 18.
- [15] A. N. Skrinsky, *Intersecting Storage Rings at Novosibirsk*, Proc. Int. Seminar on Prospects of High-Energy Physics (Morges, Mar. 1971), unpublished; extract: AIP Conf. Proc. **352**, p. 6 (1996).
- [16] G. I. Budker and A. N. Skrinsky, *Electron cooling and new possibilities in elementary particle physics*, Sov. Phys. Usp. **21**, p. 277 (1978).
- [17] A. N. Skrinsky, *Acceleration and Instrumentation Prospects of Elementary Particle Physics*, AIP Conf. Proc. **68**, p. 1056 (1980).
- [18] A. N. Skrinsky and V. V. Parkhomchuk, *Methods of cooling beams of charged particles*, Sov. J. Part. Nucl. **12**, p. 223 (1981).
- [19] A. N. Skrinsky, *Accelerator and detector prospects of elementary particle physics*, Sov. Phys. Usp. **25**, p. 639 (1982), sec. 3n.
- [20] V. V. Parkhomchuk and A. N. Skrinsky, *Ionization Cooling: Physics and Applications*, in *Proc. 12th Int. Conf. on High Energy Accel.*, ed. by F. T. Cole and R. Donaldson (Fermilab, 1983), p. 485;
<http://www-ppd.fnal.gov/muscan/munotes/mc-003.pdf>
- [21] A. N. Skrinsky, *Ionization Cooling and Muon Collider*, AIP Conf. Proc. **372**, p. 133 (1996).
- [22] A. N. Skrinsky, *Polarized Muons Beams for Muon Collider*, Nucl. Phys. B (Proc. Suppl.) **51A**, p. 201 (1996).
- [23] D. Neuffer, *Colliding Muons Beams at 90 GeV*, Fermilab report FN-319 (July 1979);
<http://www-ppd.fnal.gov/muscan/munotes/mc-001.pdf>

- [24] D. Neuffer, *Principles and Applications of Muon Cooling*, in *Proc. 12th Int. Conf. on High Energy Accel.*, ed. by F. T. Cole and R. Donaldson (Fermilab, 1983), p. 481; Part. Acc. **14**, p. 75 (1983); reproduced in AIP Conf. Proc. **353**, 12 (1996).
- [25] D. Neuffer, $\mu^+\mu^-$ colliders: possibilities and challenges in Ref. [27], p. 27.
- [26] J. Wurtele (ed.), *Advanced Accelerator Concepts* (Port Jefferson, NY, June 14-20, 1992), AIP Conf. Proc. **279** (1993); see P. Chen and K. T. McDonald, *Summary of the Physics Opportunities Working Group*, p. 853.
- [27] D. B. Cline (ed.), Proc. of the Mini-Workshop on $\mu^+\mu^-$ Colliders (Napa, CA, Dec. 1992), Nucl. Instrum. & Methods **A350**, p. 24 (1994).
- [28] H. A. Thiessen (ed.), *Proceedings of the Muon Collider Workshop*, Los Alamos National Laboratory Report LA-UR-93-866 (Feb. 1993).
- [29] P. Schoessow (ed.), *Advanced Accelerator Concepts* (Fontana, WI, 1994), AIP Conf. Proc. **335** (1995); see R. B. Palmer, D. Neuffer and J. Gallardo, *A Practical High-energy High-Luminosity $\mu^+\mu^-$ Collider*, p. 635.
- [30] D. B. Cline (ed.), *Physics Potential and Development of $\mu^+\mu^-$ Colliders* (Sausalito, CA, Nov. 1994), AIP Conf. Proc. **352** (1996).
- [31] T. Tajima (ed.), *The Future of Accelerator Physics*, Proc. of the Tamura Symposium (Austin, TX, Nov. 1994), AIP Conf. Proc. **356** (1996); see D. V. Neuffer and R. B. Palmer, *Progress Toward a High-Energy, High-Luminosity $\mu^+\mu^-$ Collider*, p. 344.
- [32] J. C. Gallardo (ed.), *Beam Dynamics and Technology Issues for $\mu^+\mu^-$ Colliders*, 9th Advanced ICFA Beam Dynamics Workshop (Montauk, NY, Oct. 15-20, 1995), AIP Conf. Proc. **372** (1996).
- [33] D. G. Cassel, L. T. Gennari and R. H. Siemann (eds.), *New Directions for High-Energy Physics*, Proc. of the 1996 DPF/DPB Summer Study on High-Energy Physics, (Stanford Linear Accelerator Center, Menlo Park, CA, 1997).
- [34] Z. Parsa (ed.), *Future High Energy Colliders* (Santa Barbara, CA, Oct. 1996), AIP Conf. Proc. **397** (1997); see D. B. Cline, *The Problems and Physics Prospects for a $\mu^+\mu^-$ Collider*, p. 203.
- [35] *Workshop on Muon Colliders* (LBNL, Feb. 1997).
- [36] Proc. 1997 Part. Accel. Conf. (PAC97) (Vancouver, Ca., 1997);
<http://www.triumf.ca/pac97/papers/>
- [37] Mini-Workshop on the Muon Collider Lattice (BNL, 1997).
- [38] Mini-Workshop on Ionization Cooling (Fermilab, Oct. 1997).
- [39] S. Geer and R. Raja (eds.), *Workshop on Physics at the First Muon Collider and at the Front End of the Muon Collider*, (Fermilab, Nov. 1997), AIP Conf. Proc. **435** (1998);
http://www.fnal.gov/projects/muon_collider/physics/talks.html
- [40] D. Cline (ed.), *Proc. 4th Int. Conf. on the Physics Potential & Development of $\mu^+\mu^-$ Colliders* (San Francisco, CA, Dec. 10-12, 1997), AIP Conf. Proc. **441** (1998).
- [41] Muon Collider Collaboration meeting (Gulf Shores, AL, Mar. 1998).
- [42] Mini-Workshop on Ionization Cooling (BNL, 1998).
- [43] R. B. Palmer, A. Sessler and A. Tollestrup, *Status Report of a High Luminosity Muon Collider and Future Research and Development Plans*, in Ref. [33], p. 203;
ftp://ftp.mumu.bnl.gov/pub/documents/aba_new.ps
- [44] The $\mu^+\mu^-$ Collider Collaboration, *$\mu^+\mu^-$ Collider Feasibility Study*, BNL-52503, FERMILAB-Conf-96/092, LBNL-38946 (July 1996);
<http://www.cap.bnl.gov/mumu/book.html>
- [45] V. Barger, M. Berger, J. Gunion and T. Han, *Higgs Boson Physics in the s-Channel at $\mu^+\mu^-$ Colliders*, Phys. Rep. **286**, 1 (1997);
<http://xxx.lanl.gov/hep-ph/9602397>
- [46] J. Gunion, *Physics at a Muon Collider*, UCD-98-5 (Nov. 1997);
<http://xxx.lanl.gov/hep-ph/9802258>
- [47] See the collection of articles at the URL
http://www.fnal.gov/projects/muon_collider/physics/physics.html
<http://puhep1.princeton.edu/mumu/physics/>
- [48] R. B. Palmer *et al.*, *Muon Collider Design*, Nucl. Phys. B (Proc. Suppl.) **51A**, p. 61 (1996).
- [49] R. B. Palmer *et al.*, *Muon Colliders*, AIP Conf. Proc. **372**, p. 3 (1996);
<http://xxx.lanl.gov/ps/acc-phys/960201>
- [50] R. B. Palmer and J. C. Gallardo, *Muon-Muon and Other High Energy Colliders*, in *Techniques and Concepts of High Energy Physics IX*, ed. by T. Ferbel (Plenum Press, NY, 1997), p. 183;
ftp://ftp.mumu.bnl.gov/pub/documents/master_stcroix.ps
- [51] R. B. Palmer and J. C. Gallardo, *High Energy Colliders*, in *Critical Problems in Physics*, ed. by V. L. Fitch, D. R. Marlow, M. A. E. Dementi (Princeton U. Press, Princeton, NJ, 1997), p. 247;
<http://xxx.lanl.gov/ps/physics/9702016>
- [52] R. B. Palmer, *Progress on $\mu^+\mu^-$ Colliders*, Proc. PAC97 (Vancouver, Ca., 1997), p. 286;
<http://www.triumf.ca/pac97/papers/pdf/6B002.PDF>
- [53] R. B. Palmer, *Muon Collider: Introduction and Status*, BNL-65241, CAP-201-MUON-98C (Jan. 1998);

- <http://xxx.lanl.gov/ps/physics/9802005>
- [54] R. B. Palmer, *Muon Collider Design*, AIP Conf. Proc. **441**, p. 183 (1998);
<http://xxx.lanl.gov/ps/physics/9802002>.
- [55] R. Palmer, A. Sessler, A. Tollestrup and J. Gallardo, *Muon Collider Overview: Progress and Future Plans*, to appear in Proc. EPAC98 Conf. (Stockholm, June 1998);
<http://xxx.lanl.gov/ps/physics/9807006>
- [56] A. G. Ruggiero, *The Muon Collider*, AIP Conf. Proc. **279**, p. 958 (1993).
- [57] S. Geer, *The Physics Potential of Neutrino Beams from Muon Storage Rings*, AIP Conf. Proc. **435**, p. 384 (1998);
http://www.fnal.gov/projects/muon_collider/talks/stevens_nu_talk.ps
- [58] S. Geer, *Muon Storage Ring Neutrino Source*, presented at Int. Workshop on JHF Science (KEK, March, 1998);
http://www.fnal.gov/projects/muon_collider/talks/sg_nu_jhf98.ps
- [59] S. Geer, *Neutrino beams from muon storage rings: Characteristics and physics potential*, Phys. Rev. **D57**, p. 6989 (1998).
- [60] R. Mohapatra, *Neutrino Physics in a Muon Collider*, AIP Conf. Proc. **435**, 358 (1998);
<http://xxx.lanl.gov/ps/hep-ph/9711444>.
- [61] D. A. Harris, and K. S. McFarland, *Detectors for Neutrino Physics at the First Muon Collider*, AIP Conf. Proc. **435**, p. 376 (1998);
<http://xxx.lanl.gov/ps/hep-ex/9804010>.
- [62] B. J. King, *Neutrino Physics at a Muon Collider*, AIP Conf. Proc. **435**, p. 334 (1998);
<http://pubweb.bnl.gov/people/bking/nufnal97.ps>
- [63] B. J. King, *Neutrino Physics at Muon Colliders*, AIP Conf. Proc. **441**, p. 132 (1998);
<http://pubweb.bnl.gov/people/bking/sf97.ps>
- [64] B. J. King, *Muon Colliders: New Prospects for Precision Physics and the High Energy Frontier*, BNL report CAP-224-MUON-98C (April, 1998), submitted to Proc. Latin Am. Symp. High Energy Phys. (San Juan, Puerto Rico, April 8-11, 1998);
<http://pubweb.bnl.gov/people/bking/pr98.ps>
- [65] J. Yu and A. V. Kotwal, *Measurements of $\sin^2 \theta_W$ at the First Muon Collider*, AIP Conf. Proc. **435**, 398 (1998).
- [66] D. Cline and D. Neuffer, *A Muon Storage Ring for Neutrino Oscillation Experiments*, AIP Conf. Proc. **68**, p. 846 (1980); reproduced in AIP Conf. Proc. **352**, p. 10 (1996);
- [67] V. Barger, M. S. Berger, J. F. Gunion and T. Han, *s-Channel Higgs Boson Production at a Muon-Muon Collider*, Phys. Rev. Lett. **75**, p. 1462 (1995).
- [68] E. Richter-Was, D. Froidevaux, F. Gianotti, L. Poggiali, D. Cavalli, S. Resconi, CERN-TH-96-111 (1996).
- [69] C. T. Hill, *Topcolor assisted technicolor*, Phys. Lett. **B345**, 483 (1995); K. Lane and E. Eichten, *Natural topcolor-assisted technicolor*, Phys. Lett. **B352**, 382 (1995); K. Lane, *Symmetry breaking and generational mixing in top-color-assisted technicolor*, Phys. Rev. **D54**, 2204 (1996).
- [70] R. Casalbuoni et al., *The pseudo-Goldstone mass spectrum*, Phys. Lett. **B285**, 103 (1992).
- [71] P. Bhat and E. Eichten, FERMILAB-CONF-98/072; K. Lane, BUHEP-98-01,
<http://xxx.lanl.gov/ps/hep-ph/9810385>, in Ref. [39]; J. Womersley, *Technihadron Production at a Muon Collider*, AIP Conf. Proc. **435**, 754 (1998); D. Dobrescu and C. T. Hill, FERMILAB-PUB-97/409-T,
<http://xxx.lanl.gov/ps/hep-ph/9712319>; R. Casalbuoni et al.,
<http://xxx.lanl.gov/ps/hep-ph/9801243>, in Ref. [39]; J. F. Gunion, UCD-98-5,
<http://xxx.lanl.gov/ps/hep-ph/9802258>; R. Casalbuoni et al., UCD-98-13.
- [72] J. F. Gunion, *Probing exotic Higgs sectors in $\ell^- \ell^-$ collisions*, Int. J. of Mod. Phys. **A13**, 2277 (1997), and references therein.
- [73] J. L. Feng, J. F. Gunion, and T. Han, *R-Parity violation and sneutrino resonances at muon colliders*,
<http://xxx.lanl.gov/ps/hep-ph/9711414>.
- [74] M. DeMarteau and T. Han, FERMILAB-CONF-98/030,
<http://xxx.lanl.gov/ps/hep-ph/9801407>, in Ref. [39].
- [75] J. Erler and P. Langacker, *Electroweak Model and Constraints on New Physics*, Eur. Phys. J., **C3**, 1 (1998), p. 90;
<http://pdg.lbl.gov>.
- [76] V. Barger, M. S. Berger, J. F. Gunion and T. Han, *Precision W-boson and top-quark mass determinations at a muon collider*, Phys. Rev. **D56**, 1714 (1997); *Precision Higgs Boson Mass Determination at Lepton Colliders*, Phys. Rev. Lett. **78**, 3991 (1997).
- [77] S. Parke, *Top Quark Physics at a Polarized Muon Collider*,
<http://xxx.lanl.gov/ps/hep-ph/9802279>.
- [78] See e.g., M. Carena and S. Protopopescu, in Ref. [39].
- [79] H. Baer, C. Chen, C. Kao, and X. Tata, *Supersymmetry reach of an upgraded Fermilab Tevatron Collider*, Phys. Rev. **D52**, 1565 (1995).
- [80] V. Barger, M.S. Berger, and T. Han, *Chargino mass determination at a muon collider*, University of Wisconsin-Madison report MADPH-98-1036
<http://xxx.lanl.gov/ps/hep-ph/9801410>.

- [81] I. Hinchliffe, in Ref. [39].
- [82] F. Paige, in Ref. [39].
- [83] V. Barger, M. S. Berger, J. F. Gunion, and T. Han, in *Proceedings of the Symposium on Physics Potential and Development of $\mu^+ \mu^-$ Colliders*, San Francisco, CA (1995), D. Cline and D. Sanders (eds.), Nucl. Phys. B (proc. suppl.) **51A**, 13 (1996).
- [84] J. Lykken, *Sparticle Masses from Kinematic Fitting at a Muon Collider*, <http://xxx.lanl.gov/ps/hep-ph/9803427>.
- [85] S. Godfrey, *New Particles and Interactions at High Energy Muon Colliders*, <http://xxx.lanl.gov/ps/hep-ph/9802212>.
- [86] V. Barger, M. S. Berger, J. F. Gunion and T. Han, *Studying a strongly interacting electroweak sector via longitudinal gauge-boson scattering at a muon collider*, Phys. Rev. **D55**, 142 (1997).
- [87] W. J. Marciano, *Low Energy Physics and the First Muon Collider* in Ref. [39], p. 58; W. Molzon, *Physics with Low Energy Muons at the Front End of the Muon Collider* ibid, p. 152.
- [88] C. Ankenbrandt and S. Geer, *Accelerator scenario and parameters for the first muon collider and front end of a muon collider*, in Ref. [39], p. 3.
- [89] Kingman Cheung, *Muon-proton Colliders: Leptoquarks and Contact Interactions* <http://xxx.lanl.gov/ps/hep-ph/9802219>, in Ref. [39].
- [90] J. Norem *et al.*, *The Proton Driver for the $\mu\mu$ Collider*, Proc. PAC97 (Vancouver, Ca., 1997), p. 399; <http://www.triumf.ca/pac97/papers/pdf/4W025.PDF>
- [91] TRIUMF, *KAON Factory Proposal*, Triumf, Sept. 1985.
- [92] *5 MW Pulsed Spallation Neutron Source, Preconceptual Design Study*, BNL-60678 (June 1994).
- [93] Chapter 3 of Ref. [44].
- [94] C. Ankenbrandt and R. Noble, *Summary of the Accelerator Working Group*, AIP Conf. Proc. **435**, 3 (1998); <http://www-lib.fnal.gov/archive/1998/conf/Conf-98-074.html>
- [95] M. Blaskiewicz *et al.*, *High Intensity Proton Operations at Brookhaven*, in *Proc. 1995 Part. Accel. Conf. (PAC95)* (Dallas, TX, 1995), p. 383.
- [96] T. Roser, *AGS Performance and Upgrades: A Possible Proton Driver for a Muon Collider*, AIP Conf. Proc. **372**, 47 (1996); <ftp://ftp.mumu.bnl.gov/pub/documents/roser.ps>
- [97] L. Ahrens *et al.*, *High Intensity Proton Acceleration at the Brookhaven AGS – An Update*, Proc. PAC97 (Vancouver, Ca., 1997), p. 89; <http://www.triumf.ca/pac97/papers/pdf/7P001.PDF>
- [98] T. Roser, *High Intensity Performance and Upgrades at the Brookhaven AGS*, *Proc. Workshop on Space Charge Physics in High Intensity Hadron Rings*, (Shelter Island, NY, May 4–7, 1998), to be published.
- [99] Y. Cho *et al.*, *A 10-GeV, 5-MW Proton Source for a Muon-Muon Collider*, AIP Conf. Proc. **372**, 31 (1996); <ftp://ftp.mumu.bnl.gov/pub/documents/harkay.ps>
- [100] S. D. Holmes (ed.), *A Development Plan for the Fermilab Proton Source*, FERMILAB-TM-2021 (Sept. 1997); <http://www-lib.fnal.gov/archive/1997/tm/c-TM-2021.pdf>
- [101] M. Popovic (ed.), *Present, Near Future and Future Performance of the Fermilab Linac*, FERMILAB-Pub-96/046 (March 1996); <http://www-lib.fnal.gov/archive/1996/pub/Pub-96-046.html>
- [102] K. Y. Ng and Z. Qian, *Space-Charge Effects of the Proposed High-Intensity Fermilab Booster*, FERMILAB-Conf-98-116 (April 1998); <http://www-lib.fnal.gov/archive/1998/conf/Conf-98-116.html>
- [103] J. E. Griffin, *RF System Considerations for the Muon Collider Proton Driver Synchrotrons*, FERMILAB-FN-669 (June 1998); <http://www-lib.fnal.gov/archive/1998/fn/FN-669.html>
- [104] C. Ankenbrandt *et al.*, *Bunching Near Transition in the AGS*, Phys. Rev. ST Accel. Beams **1**, 030101 (1998); <http://www-lib.fnal.gov/archive/1998/pub/Pub-98-006.html>
- [105] J. Norem *et al.*, *An AGS experiment to test bunching for the proton driver of the muon collider*, ANL-HEP-CP-98-32 (May 1998); J. Norem *et al.*, *Bunch Shortening Experiments in the Fermilab Booster and the AGS*, Proc. PAC97 (Vancouver, Ca., 1997), p. 396; <http://www.triumf.ca/pac97/papers/pdf/4W024.PDF>
- [106] D. Trbojevic *et al.*, *A Proton Driver for the Muon Collider Source with a Tunable Momentum Compaction Lattice*, Proc. PAC97 (Vancouver, Ca., 1997), p. 1030; <http://www.triumf.ca/pac97/papers/pdf/7W017.PDF>
- [107] J. E. Griffin, K. Y. Ng, Z. B. Qian and D. Wildman, *Experimental Study of Passive Compensation of Space Charge Potential Well Distortion at the Los Alamos National Laboratory Proton Storage Ring*, FERMILAB-FN-661 (Dec. 1997); <http://www-lib.fnal.gov/archive/1997/fn/FN-661.html>
- [108] J. E. Griffin *et al.*, IEEE Trans. Nucl. Sci. **NS-30**, 3502 (1983).

- [109] J. M. Brennan and M. M. Blaskiewicz, *Proc. Workshop on Space Charge Physics in High Intensity Hadron Rings*, (Shelter Island, NY, May 4–7, 1998), to be published.
- [110] N. Mokhov, R. Noble and A. Van Ginneken, *Target and Collection Optimatization for Muon Colliders*, AIP Conf. Proc. **372**, 61 (1996);
<http://www-lib.fnal.gov/archive/1996/conf/Conf-96-006.html>
- [111] N. V. Mokhov and A. Van Ginneken, *Pion Production and Targetry at $\mu^+\mu^-$ Colliders*, FERMILAB-Conf-98/041 (Jan. 1998);
<http://www-lib.fnal.gov/1998/archive/conf/Conf-998-041.html>.
- [112] D. Ehst, N. V. Mokhov, R. J. Noble and A. Van Ginneken, *Target Options and Yields for a Muon Collider Source*, Proc. PAC97 (Vancouver, Ca., 1997), p. 393;
<http://www.triumf.ca/pac97/papers/pdf/4W023.PDF>
- [113] H. Takahashi, Y. An, X. Chen and M. Nomura, *Optimization of the Target for Muon Colliders*, Proc. PAC97 (Vancouver, Ca., 1997), p. 402;
<http://www.triumf.ca/pac97/papers/pdf/4W027.PDF>
- [114] S. H. Kahana, Y. Pang and T. J. Schlagel, in *Proc. Heavy Ion Physics at the AGS - HIPAGS '93*, ed. by G. S. F. Stephanos *et al.*; D. Kahana and Y. Torun, *Analysis of Pion Production Data from E-802 at 14.6 GeV/c Using ARC*, BNL-61983 (July 1995);
<http://bnlnth.phy.bnl.gov/arc/arc.html>
<http://www-pat.fnal.gov/muSim/ARC.html>
- [115] N. V. Mokhov, *The MARS Code System User's Guide, Version 13(98)*, FERMILAB-FN-628 (Feb. 1998);
<http://www-ap.fnal.gov/MARS/>
- [116] N. V. Mokhov and S. I. Striganov, *Model for Pion Production in Proton-Nucleus Interactions*, FERMILAB-Conf-98-053 (Feb. 1998);
<http://www-lib.fnal.gov/archive/1998/conf/Conf-98-053.html>
- [117] J. Ranft, *DPMJET version II.3 and II.4*, INFN-AE-97-45 (1997);
<http://preprints.cern.ch/cgi-bin/setlink?base=preprint&categ=scan&id=SCAN-9711078>.
- [118] Experiment E-910 at BNL-AGS;
<http://www.nevis.columbia.edu/heavyion/e910/>
- [119] Hiroyoshi Hiejima, Columbia University (heijima@nevis1.columbia.edu), private communication.
- [120] R. B. Palmer *et al.*, *Monte Carlo Simulations of Muon Production*, AIP Conf. Proc. **352**, 108 (1996);
<ftp://ftp.mumu.bnl.gov/pub/documents/monte1.ps>
- [121] J. Lettry *et al.*, *Experience with ISOLDE Molten Metal Targets at the CERN-PS Booster*, in Proceedings of ICANS-XIII (1995);
<http://puhep1.princeton.edu/mumu/target/lettry/1.html>
- [122] C. Johnson, *Solid and Liquid Targets Overview*,
<http://nicewww.cern.ch/cdj/public/mumutarg/>
- [123] L. Ni and G. Bauer, *Dynamic Stress of a Liquid Metal Target Container under Pulsed Heating*, PSI prpeprint (1998);
<http://puhep1.princeton.edu/mumu/target/bauer/1.html>
- [124] C. Lu and K. T. McDonald, *Low-Melting-Temperature Metals for possible Use as Primary Targets at a Muon Collider Source*, Princeton/ $\mu\mu$ /97-3 (May 1998);
<http://www.hep.princeton.edu/mumu/mumu-97-3.ps>
- [125] R. Weggel, *Deceleration of Conductor by Magnetic Field: 1) Paraxial; 2) Perpendicular*, BNL report CAP-220-MUON-98R (1998).
- [126] C. Lu and K. T. McDonald, *Flowing Tungsten Powder for Possible Use as the Primary Target at a Muon Collider Source*, Princeton/ $\mu\mu$ /98-10 (Mar. 15, 1998);
<http://www.hep.princeton.edu/mumu/mumu-98-10.ps>
- [127] B. J. King, N. V. Mokhov and R. Weggel, *A Cu-Ni Rotating Band Target for Pion Production at Muon Colliders* (April 1998);
<http://pubweb.bnl.gov/people/bking/talks.html>
- [128] R. Weggel, *4-MW Hollow-Conductor Magnets for 20 T Hybrid Systems to Collect Pions for a Muon Collider*, BNL report MU-015 (Jan. 1997).
- [129] J. R. Miller *et al.*, *An Overview of the 45-T Hybrid Magnet System for the New National High Magnetic Field Laboratory*, IEEE Trans. Magn. **30**, 1563 (1994).
- [130] J. Broere *et al.*, *High Power Conditioning of the 202 MHz IH Tank2 at the CERN LINAC3*, Proc. LINAC98, Chicago (1998);
<http://www.aps.anl.gov/conferences/LINAC98/papers/TH4004.pdf>.
- [131] H. Gaiser *et al.*, *Status of the 36 MHz Linac Cavities for the GSI High Current Injector*, Proc. PAC99, New York, (1999);
<http://ftp.pac99.bnl.gov/Papers/Wpac/FRA70.pdf>.
- [132] R. B. Palmer and J. C. Gallardo, *MC: Fortran program to simulate the front end and cooling section*, unpublished.
- [133] see p. 220 of Ref. [44].

- [134] K. Assamagan *et al.*, *Measurement of the muon momentum in pion decay at rest using a surface muon beam*, Phys. Lett. **B335**, 231 (1994).
- [135] E. P. Wigner, *On Unitary Representation of the Inhomogeneous Lorentz Group*, Ann. Math. **40**, 149 (1939).
- [136] E. P. Wigner, *Relativistic Invariance and Quantum Phenomena*, Rev. Mod. Phys. **29**, 255 (1957).
- [137] B. Norum and R. Roszmanith, *Polarized beams in a muon collider*, Nucl. Phys. B (Proc. Suppl.) **51A**, 191 (1996).
- [138] J. Alessi *et al.*, *An R&D Program for Targetry at a Muon Collider*, proposal to the BNL AGS (Sept. 1998); <http://puhep1.princeton.edu/mumu/target/targetprop.ps>
- [139] A. A. Mikhailichenko and M. S. Zolotorev, *Optical Stochastic Cooling*, Phys. Rev. Lett. **71**, 4146 (1993).
- [140] A. Hershcovitch, *Some Options for Pion and Muon Focusing in the AGS g-2 and Neutrino Oscillation Experiments (and Possible New Focusing and Cooling Schemes for a Muon Collider)*, AGS/AD Tech. Note No. 413 (BNL, Feb. 1996); *High Current Magnetized Plasma Discharges and Electron Beams for Capture and Cooling of Charged Leptons and Hadrons*, Proc. PAC97 (Vancouver, Ca., 1997), p. 1792; <http://www.triumf.ca/pac97/papers/pdf/4V024.PDF>
- [141] P. Chen, Z. Huang and R. Ruth, *Radiation and Radiation Reaction in Continuous Focusing Channels*, AIP Conf. Proc. **335**, 646 (1995).
- [142] P. H. Sandler, S. A. Bogacz and D. B. Cline, *Muon Cooling and Acceleration Experiment using Muon Sources at TRIUMF*, AIP Conf. Proc. **352**, 146 (1996).
- [143] Chapter 6 of Ref. [44].
- [144] R. C. Fernow and J. C. Gallardo, *Muon transverse ionization cooling: Stochastic approach*, Phys. Rev. E **52**, 1039 (1995); <ftp://ftp.mumu.bnl.gov/pub/documents/stochastic.ps>
- [145] R. C. Fernow and J. C. Gallardo, *Validity of the differential equations for ionization cooling*, AIP Conf. Proc. **352**, 170 (1996).
- [146] Particle Data Group, *Review of Particle Physics*, Eur. Phys. J. C **3**, 1 (1998), p. 138; <http://pdg.lbl.gov>
- [147] A. Van Ginneken, *Fluctuations of muon energy loss and simulation of ionization cooling*, Nucl. Instrum. & Methods **A362**, 213 (1995).
- [148] R. Fernow, *ICOOL: Fortran program to simulate muon ionization cooling*, unpublished; <http://pubweb.bnl.gov/people/fernow/readme.html> <http://www-pat.fnal.gov/muSim/icoool.html>
- [149] R. Fernow, *ICOOL: a simulation code for ionization cooling of muon beams*, submitted to Proceedings of PAC99; <http://pubweb.bnl.gov/people/fernow/reports/icoop99.ps>.
- [150] H. Kirk, *Parmela modeling of alternating solenoids*, presented at [42] (1998).
- [151] *GEANT manual, v.3.2.1*, CERN program Library W5013 (CERN, 1994); http://wwwinfo.cern.ch/asdoc/geant_html3/geantall.html
- [152] P. Lebrun, *Alternate solenoid in DPGeant*, presented at [42] (1998).
- [153] C. M. Celata, A. M. Sessler, P. B. Lee, B. A. Shadwick and J. S. Wurtele, *A moment expansion approach to a muon collider cooling lattice*, to appear in Proc. EPAC98 Conf. (Stockholm, June 1998).
- [154] R. Palmer, *An Introduction to Ionization Cooling Theory*, <http://pubweb.bnl.gov/people/palmer/course/6cool.ps>.
- [155] R. B. Palmer, *The Angular Momentum Problem, or Why We Reverse the Solenoids*, BNL-CAP-MU-022 (1998); <http://pubweb.bnl.gov/people/palmer/notes/whyalt.ps>.
- [156] G. Silvestrov, in Ref. [28].
- [157] B. Bayanov *et al.*, *A Lithium Lens for Axially Symmetric Focusing of High Energy Particle Beams*, Nucl. Instrum. & Methods **190**, 9 (1981).
- [158] C. D. Johnson, *Present and Future Possibilities of Antiproton Production from Fixed Targets at CERN*, Hyperfine Interactions **44**, 21 (1988).
- [159] G. Silvestrov, *Lithium Lenses for Muon Colliders*, AIP Conf. Proc. **372**, 168 (1996); <ftp://ftp.mumu.bnl.gov/pub/documents/greg.ps>
- [160] V. Balbekov and A. Van Ginneken, presented at [38] (Oct. 1997).
- [161] V. Balbekov and A. Van Ginneken, *Ring Cooler for Muon Collider*, AIP Conf. Proc. **441**, p. 310 (1998).
- [162] R. C. Fernow, J. C. Gallardo, H. G. Kirk and R. B. Palmer, *Transverse Cooling in the Muon Collider*, submitted to Proc. 8th Workshop on Advanced Accelerator Concepts (Baltimore, MD, July 5-11, 1998); <http://pubweb.bnl.gov/people/fernow/reports/asol.ps>
- [163] M. Leupold, et al., *30 T magnet facility at the Francis Bitter National Magnet Laboratory, MIT*, IEEE Trans. Magn. MAG-17, Proc. 7th Int. Conf. on Magnet Tech., p. 1779-1782 (1981); H.-J. Schneider-Muntau and J. Vallier, IEEE Trans. Magn. **24**, p. 1067-1069 (1988).
- [164] See Ref. [129]; R. Weggel *et al.*, *Final Design of a 24 MW radially-cooled insert for a 45 T Hybrid System*, Proc. 14th Int. Conf. on Magnet Tech., p. 2474-2477 (1995).
- [165] J. C. Gallardo, R. C. Fernow and R. B. Palmer, *Muon Dynamics in a Toroidal Sector Magnet*, AIP Conf. Proc. **441**, p. 282 (1998).

- [166] J. Norem, *Coupling sections, emittance growth, and drift compensation in the use of bent solenoids as beam transport elements*, Phys. Rev. ST Accel. Beams **2**, 000000 (1999).
- [167] D. Neuffer, *Phase Space Exchange in Thick Wedge Absorbers for Ionization Cooling*, AIP Conf. Proc. **441**, p. 270 (1998).
- [168] D. Neuffer and A. Van Ginneken, presented at [42] (Jan. 1998).
- [169] D. Neuffer and W. Wan, *COSY transport for μ cooling*, presented at [38] (Oct. 1997).
- [170] N. Holtkamp, *Heat Distribution in a Beryllium Foil in a High Gradient rf Cavity* FNAL-Internal Note (1999); <http://www-mucool.fnal.gov/mcnotes/muc0013.ps>
D. Li *et al.*, *Temperature Distribution Calculations on Be windows in rf cavities for a Muon Collider*: <http://www.aps.anl.gov/conferences/LINAC98/papers/MO4089.pdf>
- [171] C. N. Ankenbrandt *et al.*, *Ionization Cooling Research and Development Program for a High Luminosity Muon Collider*, Fnal-P904 (April 15, 1998); http://www.fnal.gov/projects/muon_collider/
- [172] S. Geer, *Ionization Cooling Research and Development Program for a High Luminosity Muon Collider*, FERMILAB-Conf-98/136, presented at the International Workshop on JHF Science (JHF98), KEK, Tsukuba-shi, Ibaraki, Japan; <http://fnalpubs.fnal.gov/archive/1998/conf/Conf-98-136.html>
- [173] C. Lu, K. T. McDonald, E. J. Prebys and S. E. Vahsen, *A Detector Scenario for the Muon Cooling Experiment*, Princeton/ $\mu\mu$ /97-8 (May, 1998); <http://www.hep.princeton.edu/mumu/mumu-97-8.ps>
- [174] F. Mills, FNAL (fredmills@aol.com), private communication.
- [175] B. J. King, *Variable Field Bending Magnets for Recirculating Linacs*, BNL-CAP-MU-023, 1998; <http://pubweb.bnl.gov/people/bking/magnet.ps>
- [176] D. Neuffer, *Analyses and simulations of longitudinal motion in μ -recirculating linacs*, Nucl. Instrum. and Methods **A384**, 263 (1997).
- [177] D. V. Neuffer, *Acceleration to Collisions for the $\mu^+\mu^-$ Collider*, AIP Conf. Proc. **372**, 315 (1996); <ftp://ftp.mumu.bnl.gov/pub/documents/aclmntk.ps>
- [178] D. Summers, D. Neuffer, Q.-S. Shu and E. Willen, *Acceleration for the $\mu^+\mu^-$ Collider*, Proc. PAC97 (Vancouver, Ca., 1997), p. 624; <http://www.triumf.ca/pac97/papers/pdf/3PC004.PDF>
- [179] D. J. Summers, *Hybrid Rings of fixed 8 T Superconducting Magnets and Iron Magnets Rapidly Cycling between -2 T and +2 T for a Muon Collider*, in Ref. [33], p. 238.
- [180] TESLA Collaboration, *TESLA Test Facility Linac-Design Report*, ed. by D. Edwards, TESLA 95-01 (1995).
- [181] Z. D. Farkas *et al.*, *SLED: A Method of Doubling SLAC's Energy*, SLAC-PUB-1435; in *Proc. of the 9th Int. Conf. on High Energy Accelerators* (Stanford, CA, 1974), p. 576.
- [182] E. Willen, *Pulsed Dipole Magnets for the Muon Collider*, Magnet Note 555-31 (BNL, May 1996); also in Ref. [33], p. 246.
- [183] *Allied Signal*, Amorphous Metals Division, 6 Eastmans Road, Parsippany, NJ 07054.
- [184] *Magnetics*, Division of Spang & Company, 900 East Butler Road, Butler, PA 16003.
- [185] I. Campisi, Jefferson Lab, (campisi@jlab.org), private communication.
- [186] A. Mosnier and O. Napoly, *Wakefield effects in a Superconducting Linear Collider*, Int. J. Mod. Phys. A (Proc. Suppl.) **2B**, 963 (1993).
- [187] A. Novokhatski and A. Mosnier, *Wakefield Dynamics in Quasiperiodic Structures*, Proc. PAC97 (Vancouver, Ca., 1997), p. 467; <http://www.triumf.ca/pac97/papers/pdf/8W013.PDF>
- [188] V. Balakin, A. Novokhatsky and V. Smirnov, *VLEPP: Transverse Beam Dynamics* in *Proc. 12th Int. Conf. on High Energy Accel.*, ed. by F. T. Cole and R. Donaldson (Fermilab, 1983), pag. 119;
- [189] A. Chao, *Physics of Collective Beam Instabilities in High Energy Accelerators* (John Wiley & Sons, Inc., New York, 1993).
- [190] K. L. Brown and J. Spencer, *Nonlinear Optics for the Final Focus of the Single Pass Collider*, IEEE Trans. Nucl. Sci. **NS28**, 2568 (1981).
- [191] K. L. Brown, *Basic Optics of the SLC Final Focus System*, SLAC-PUB-4811 (Dec. 1988).
- [192] K. L. Brown J. J. Murray and T. H. Fieguth, *The Completed Design of the SLC Final Focus System*, SLAC-PUB-4219 (Feb. 1987); http://ccdb1.kek.jp/cgi-bin/img_index?8706254
- [193] O. Napoly, *CLIC Final Focus System: Upgraded Version with Increased Bandwidth and Error Analysis*, CLIC Note 227 (CERN, 1994).
- [194] C. Johnstone *et al.*, *An Isochronous Lattice Design for a 50 on 50 GeV Muon Collider*, AIP Conf. Proc. **441**, p. 209 (1998).
- [195] C. J. Johnstone and N. V. Mokhov, *Optimization of a Muon Collider Interaction Region with Respect to Detector Backgrounds and the Heat Load to the Cryogenic Systems*, in Ref. [33], p. 226; FERMILAB-Conf-96-366 (1996); <http://www-lib.fnal.gov/archive/1996/conf/Conf-96-366.html>
- [196] A. Drozdin *et al.*, *Scraping Beam Halo in $\mu^+\mu^-$ Colliders*, AIP Conf. Proc. **441**, p 242 (1998); FERMILAB-Conf-98/042 (1998);

- <http://www-lib.fnal.gov/archive/1998/conf/Conf-98-042.html>
- [197] M. Donald *et al.*, *Localized Chromaticity Correction of Low-Beta Insertions in Storage Rings*, Proc. 1993 Part. Accel. Conf. (Washington, D.C., 1993), p. 131.
- [198] W. Wan and C. Johnstone, *Tracking simulations of local, interleaved and noninterleaved chromatic correction sextupoles*, presented at [37] (1997).
- [199] K.-Y. Ng, S.Y. Lee and D. Trbojevic, FNAL-FN595 (Fermilab, 1992).
- [200] S. Y. Lee, K. Y. Ng and D. Trbojevic, *Minimizing dispersion in flexible-momentum-compaction lattices*, Phys. Rev. E **48**, 3040 (1993).
- [201] M. Berz, *COSY INFINITY*, V. 8. User's Guide and Reference Manual (Nov. 1997);
<http://www.beamtheory.nscl.msu.edu/cosy/>
- [202] S. Ohnuma, ohnuma@uh.edu, Inst. for Beam Particle Dynamics; Rm. 632 SR1; Houston, TX 99204-5506, private communication.
- [203] N. Merminga and K.Y. Ng, *Hamiltonian Approach to Distortion Functions*, Fermilab Report FN-493, 1988.
- [204] Y. T. Yan, SLAC (yan@slac.stanford.edu), private communication.
- [205] L. Schachinger and R. Talman, *TEAPOT: A Thin-Element Accelerator Program for Optics and Tracking*, Part. Accel. **22**, 35 (1987).
- [206] G. W. Foster and N. V. Mokhov, *Backgrounds and Detector Performance at a 2×2 TeV $\mu^+ \mu^-$ Collider*, AIP Conf. Proc. **352**, 178 (1996).
- [207] M. Furman, *The Classical Beam-Beam Interaction for the Muon Collider: A First Look*, BF-19/CBP-Note-169/LBL-38563 (1996).
- [208] P. Chen, *Beam-beam interaction in muon colliders*, Nucl. Phys. B (Proc. Suppl.) **51A**, 179 (1996).
- [209] W.-H. Cheng, A. M. Sessler and J. Wurtele, *Studies of Collective Instabilities in Muon Collider Rings*, AIP Conf. Proc. **372**, 206 (1996).
- [210] K. Y. Ng, *Beam stability Issues in a Quasi-Isochronous Muon Collider*, AIP Conf. Proc. **372**, 224 (1996).
- [211] N. V. Mokhov and S. I. Striganov, *Simulation of Backgrounds in Detector and Energy Deposition in Superconducting Magnets at $\mu^+ \mu^-$ Colliders*, AIP Conf. Proc. **372**, 234 (1996);
<http://www-lib.fnal.gov/archive/1996/conf/Conf-96-011.html>
- [212] E. Willen *et al.*, *A Helical Magnet Design for RHIC*, Proc. PAC97 (Vancouver, Ca., 1997), p. 3362;
<http://www.triumf.ca/pac97/papers/pdf/3P010.PDF>
- [213] T. Roser (Spokesperson) *et al.*, *Conceptual Design for the Acceleration of Polarized Protons in RHIC* (Feb. 1995);
<http://www.ags.bnl.gov/~rosler/cdr07034/cdr07034.html>
- [214] E. Willen, BNL (willen@bnl.gov), private communication.
- [215] N. V. Mokhov, *Radiation Issues of a $\mu^+ \mu^-$ Collider*, FERMILAB-Conf-96/367 (Oct. 1996);
<http://www-lib.fnal.gov/archive/1996/conf/Conf-96-367.html>
- [216] *The Physics Opportunities and Technical Challenges of a Muon Collider*, BNL-CAP-MU-024;
<http://pubweb.bnl.gov/people/bking/1996/>.
- [217] B. J. King, *Neutrino Radiation Hazard at Muon Colliders*, presented at [35] (Feb. 1997).
- [218] B. J. King, *A Characterization of the Neutrino-Induced Radiation Hazard at TeV-Scale Muon Colliders*, BNL report CAP-162-MUON-97R (1997).
- [219] B. J. King, *Neutrino Radiation at Muon Colliders* (April 1998);
http://pubweb.bnl.gov/people/bking/nurad_aps98/
- [220] Particle Data Group, *Review of Particle Physics*, Eur. Phys. J. C **3**, 1 (1998), p. 163;
<http://pdg.lbl.gov>
- [221] C. Johnstone and N. Mokhov, *Shielding the Muon Collider Interaction Region*, Proc. PAC97 (Vancouver, Ca., 1997), p. 414;
<http://www.triumf.ca/pac97/papers/pdf/4W030.PDF>
- [222] K. V. Lotov, A. N. Skrinsky and A. V. Yashin, *Plasma Supression of Beam-Beam Interaction in a Muon Collider*, Budker INP 98-41.
- [223] I. Stumer *et al.*, *Study of Detector Backgrounds at a Muon Collider*, in Ref. [33], p. 463.
- [224] N. V. Mokhov, *Comparison of backgrounds om detectors for LHC, NLC and $\mu^+ \mu^-$ colliders*, Nucl. Phys. B (Proc. Suppl.) **51A**, 210 (1996);
<http://fnalpubs.fnal.gov/archive/1996/conf/Conf-96-062.html>
- [225] Sec. 8.5.3 of Ref. [44].
- [226] I. Ginzburg, *The $e^+ e^-$ pair production at $\mu^+ \mu^-$ collider*, Nucl. Phys. B (Proc. Suppl.) **51A**, 186 (1996);
<http://xxx.lanl.gov/ps/hep-ph/9601273>
- [227] S. Geer, *Backgrounds and detector issues at a muon collider*, in Ref. [33].
- [228] The SLD collaboration, *The SLD CCD vertex detector and its upgrade*, Nuovo Cimento **109A**, 1027 (1996).
- [229] E. Gatti and P. Rehak, *Semiconductor Drift Chamber - An Application of a Novel Charge Transport Scheme*, Nucl. Instrum. & Methods, **225**, 608 (1984).
- [230] Sherwood I. Parker, Christopher J. Kenney, Julie Segal, *3D: A New Architecture for Solid State Radiation Detectors*, UH-511-839-96, 24pp. Submitted to Nucl. Instrum. & Methods.

- [231] S. Geer and J. Chapman, *The Pixel Micro-Telescope*, in Ref. [33], FERMILAB-CONF-96-375.
- [232] Sec. 9.4.2 of Ref. [44].
- [233] M. Atac, *Directional muon jet chamber for a muon collider (groovy chamber)*, FERMILAB-CONF-96-401, Oct. 1996.
Presented at the 1996 DPF/DPB Summer Study on New Directions for High-Energy Physics (Snowmass96).
- [234] R. Raja, *A Feasibility Study of the Channel $\mu^+\mu^- \rightarrow \mu^+\mu^- + \text{Higgs}$ Using the Missing Mass Technique at the 4 TeV in the Center of Mass*, Fermilab Muon Collider Note MC-042, April 1997.