Project Title: International Symposia on High Energy Spin Physics
 Project Director: A. D. Krisch, Ph.D.
 Grant Number: DE-FG02-98ER41063
 Project Period: 2/1/1998 through 1/31/1999

Final Report of Project Grant

The U.S. Department of Energy High Energy Physics Division provided \$10,000 during 1997-1998, as partial support for the 1998 International Symposium on High Energy Spin Physics, which has been held every second September since 1974, and for its five associated Workshops that usually focus on some particular technical issue which is currently important to the field of High Energy Spin Physics. Similar funds were provided by Argonne Universities Association (AUA) during 1974-1978, by University of Michigan during 1979-1994 and 1999-2004, and by DoE during 1995-1996.

These Symposia and Workshops serve as a focus for the important, but technically difficult, field of High Energy Spin Physics, which requires state-of-the-art spin-polarized beams and spin-polarized targets. The Symposia and Workshops are guided by the standing International Committee for High Energy Spin Physics Symposia, which approves the content and location of the Symposia and Workshops. The Committee's Members are elected to 4-year terms; some of the more active and/or distinguished Members have served a number of terms. The Proceeding of each Symposium or Workshop is published, usually by a publisher near the meeting site.

The funds provided by DoE were used to partially support the 13th International Symposium, which was hosted by IHEP-Protvino, and the five Workshops, as described below.

SPIN97 Workshop \$1000
 Joint Institute for Nuclear Physics
 Dubna RU-141980, Russia
 7-12 July 1997

7th International Workshop on Polarized Gas Targets
 University of Illinois
 Urbana, Illinois 61801-3080, USA
 18-22 August 1997

Workshop on NMR in Polarized Targets
 University of Virginia
 Charlottesville, Virginia 22901, USA

Workshop on Spin Physics at Low Energy \$1000
 St. Petersburg State Technical University
 St. Petersburg RU-195291, Russia
 2-5 September 1998

DOE Patent Clearance Granted
MP Dvorscak
 Mark P. Dvorscak
 (630) 252-2393
 E-mail: mark.dvorscak@ch.doe.gov
 Office of Intellectual Property Law
 Chicago Operations Office
 10/30/01
 Date

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

13th International Symposium on High Energy Spin Physics \$5000
Institute for High Energy Physics
Protvino RU-142284, Russia
8-12 September 1998

Workshop on Intermediate Energy Spin Physics \$1000
Forschungszentrum, Institute for Nuclear Physics
Juelich D-52425, Germany
18-20 November 1998

TOTAL \$10,000

A copy of the cover page and program for the 1998 Symposium and for each Workshop is provided. To obtain a full copy of any of the Symposium or Workshop Proceedings, contact Professor C.Y. Prescott at SLAC, e-mail: prescott@slac.stanford.edu. Professor Prescott served as Chair of the International Committee from 1995 through 2000.

Professor T. Roser, at Brookhaven, was recently elected Chair for 2001-2004; e-mail: roser@bnl.gov.

My term as Chair ran from 1974 through 1998. I was elected Past-Chair for 1995 through 2004. I would like to take this opportunity to thank DoE for providing this support during 1997-1998 and the earlier 1995-1996 transitional period.

Best Regards,

A.D. Krisch
Professor of Physics, University of Michigan
Past-Chair, International Committee for High Energy Spin Physics Symposia

Submitted May 10, 2001

①

Proceedings of the Workshop on NMR in Polarized Targets

**University of Virginia
Charlottesville, Virginia**

April 15 & 16, 1998

**Editors: S. Bültmann and D. G. Crabb
University of Virginia**

Table of Contents

D. G. Crabb,
Introduction

Large Signals and Non-Linearities

G. R. Court and M. A. Houlden, 1
The Effect of Coil Stray Capacitance on the Performance of a Series Tune NMR Q-Meter

G. R. Court and M. A. Houlden, 7
Possible Method to Reduce the Size of the Background Signal in Continuous Wave Q-Meters

S. I. Penttilä et al., 15
Large NMR Signals and Polarization Asymmetries

P. Bosted, 24
Evidence of Proton Polarization Measurement Problems from E155 g_1 data

W. A. Tobias, 27
NMR Coil Configuration and Effects Observed During the Operation of the E155 Polarized Target

NMR Simulation

G. R. Court and M. A. Houlden, 35
Modelling Non-Constant Current Effects for a Series Tune NMR Q-Meter Used for Nucleon Polarisation Measurements

M. L. Seely et al., 46
Simulation and Tuning of the TUNL NMR System

Detection of Small Signals

P. Hautle, 54
Detection of Small NMR Signals

R. De Vita, 67
Design and Optimization of the NMR Coils for the Hall B Polarized Target at TJNAF

Polarization Measurement and EST

G. Reicherz et al., <i>Polarization Measurement of $^{15}\text{NH}_3$ and $^{14}\text{NH}_3$ and Test of the EST-Theory</i>	77
C. Harris, <i>Lithium Polarizations in ^6LiD</i>	83
S. Bültmann, <i>Results from A Polarized Lithium Deuteride Target at SLAC</i>	91
T. J. Liu, <i>Beam Heating Effects on NMR-Measured Target Polarization</i>	97
D. G. Haase et al., <i>Calibrating Target Polarization in a Polarized Neutron - Polarized Proton Transmission Experiment</i>	103
A. S. Brill, <i>Consideration of an EPR Method to Measure Nucleon Spin Polarization in Solid Ammonia Targets</i>	109

NMR Signal Processing

P. M. McKee, <i>NMR Measurement Using LabVIEW During SLAC Experiment E155</i>	113
T. Iwata et al., <i>New NMR Data Taking System for Nagoya Polarized Target</i>	119

Poster

S. Forthmann, <i>Polarized Neutron Scattering from Selectively Polarized Proton Spins Near Paramagnetic Centers</i>	124
D. G. Crabb, <i>Workshop Summary</i>	125
List of Participants	129

Forschungszentrum Jülich
Institute for Nuclear Physics

Intermediate Energy Spin Physics

**Progress Report of the 213. WE-Heraeus Seminar held at the
Forschungszentrum Jülich, Germany, from 18 to 20 November 1998.**

Edited by F. Rathmann, W.T.H. van Oers and C. Wilkin

Progress Report

Publisher: Forschungszentrum Jülich GmbH
and Distributor: Institute for Nuclear Physics
D-52425 Jülich
Germany
Phone: +49 24 61 61 59 43 • Fax: +49 24 61 61 39 30

Technical Editor: M. Hennebach

Printed on environmentally friendly paper.

Contents

1 Introduction	vii
2 Synopsis	x
3 Conclusions and Recommendations	xv
Session I	1
Chair: Kurt Kilian, FZ-Jülich	
Scientific secretaries: Christoph Hanhart, FZ-Jülich	
Eduard Roderburg, FZ-Jülich	
<i>Polarization in Meson Production Reactions</i>	3
Hans-Otto Meyer, Indiana University	
<i>Polarization in Meson Production Reactions</i>	19
Johann Haidenbauer, FZ-Jülich	
<i>Frozen Spin Polarized Targets</i>	35
Werner Meyer, Universität Bochum	
Session II	59
Chair: Josef Speth, FZ-Jülich	
Scientific secretaries: Johann Haidenbauer, FZ-Jülich	
Eduard Roderburg, FZ-Jülich	
<i>Polarization Effects in Nucleon-Nucleon Pion</i>	
<i>Production</i>	61
Leonid Kondratyuk, ITEP-Moscow	

iv

<i>Polarization Effects in Proton-Deuteron Pion</i>	
<i>Production</i>	71
Willie Falk, University of Manitoba	
<i>Where is the Spin of the Nucleon?</i>	81
Wally Melnitchouk, FZ-Jülich	
<i>Probing Few-Body Systems with Bremsstrahlung</i>	117
Nasser Kalantar, Universiteit Groningen	
<i>What can be learned from Nucleon-Nucleon</i>	
<i>Bremsstrahlung?</i>	127
Olaf Scholten, Universiteit Groningen	
<i>Polarization in Hyperon Production</i>	133
Jean-Marc Laget, Centre d'Etudes de Saclay	
Session III	153
Chair: Richard A. Arndt, Virginia Tech	
Scientific secretaries: Christoph Hanhart, FZ-Jülich	
Frank Rathmann, Universität Erlangen	
<i>Nucleon-Nucleon Scattering</i>	155
Frank Hinterberger, Universität Bonn	
<i>The Nucleon-Nucleon Interaction at Intermediate</i>	
<i>Energies</i>	169
Ruprecht Machleidt, University of Idaho	
<i>Polarization in Hyperon Production</i>	193
Steven E. Vigdor, Indiana University	

Session IV 211

Chair: Markus Simonius, ETH-Zürich

Scientific secretaries: Walter-Reiner Geyer, FZ-Jülich

Wally Melnitchouk, FZ-Jülich

**Parity Violation in Hadronic Systems and the
Standard Model 213**

Michael Ramsay-Musolf, University of Connecticut

Parity Violation in the Nucleon-Nucleon System 227

J.David Bowman, LANL

Testing Time-Reversal-Invariance at COSY 245

Paul-Dieter Eversheim, Universität Bonn

Charge Symmetry Breaking/Isospin Nonconservation... 251

Willem T.H. van Oers, University of Manitoba

FZ-Jülich

Optically Pumped Polarized Ion Sources 265

Anatoly N.Zelenski, INR-Moscow/TRIUMF

Session V 281

Chair: Yoshiharu Mori, KEK

Scientific secretaries: Paul-Dieter Eversheim, Universität Bonn

Frank Rathmann, Universität Erlangen

Acceleration of Polarized Beams in COSY 283

Andreas Lehrach, FZ-Jülich

Polarized Proton and Deuteron Ion Sources**for COSY 293**

Ralf Gebel, FZ-Jülich

Siberian Snakes and the IUCF Cooler Ring 301

Alan D.Krisch, University of Michigan

Atomic Beam Polarized Targets 313

Erhard Steffens, Universität Erlangen

Session VI 339

Chair: Walter Gloeckle, Universität Bochum

Scientific secretaries: Johann Haidenbauer, FZ-Jülich

Walter-Reiner Geyer, FZ-Jülich

Hyperon-Nucleon Scattering 341

Ronald Ransome, Rutgers University

The Hyperon-Nucleon Interaction 353

Rob E.Timmermans, Universiteit Groningen

Polarized Deuteron Interactions 367

Marcel Morlet, IPN d'Orsay

Deuteron Backward Scattering and High Momentum**Components of the Deuteron Wave Function 387**

Charles F.Perdrisat, College of William and Mary

List of Participants 401