



SpinQuest E1039 MUO

11.25.2020

SpinQuest Collaboration

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Overview

This document is a memorandum of understanding (MOU) between the SpinQuest and its collaboration members as well as joining new members. The MOU is intended primarily for the purpose of recording expectations and commitments from the various institutions and university groups that make up the collaboration. The work allocations and commitments as well as institutional roles and responsibilities are recorded here and updated through an amendment process led by the Collaboration Chair and Institutional Board. It reflects an arrangement that currently is satisfactory to the parties; however, it is recognized and anticipated that changing circumstances of the evolving research program will necessitate revisions. The parties agree to modify this scope of work to reflect such required adjustments. All contractual obligations should be specified in this document and updated with every new institution and commitment..

SpinQuest Collaboration Bylaws

Spokesperson

The Spokespeople are responsible to FNAL and to the Collaboration for the experiment. There are two Spokespeople that serve as contacts for the experiment and oversee all activities of the project. These are generally the people who proposed the experiment but responsibility can be passed down as the project evolves. FNAL must always be notified of these changes. The spokespersons are responsible for organizing the support required for the experiment and maintaining good correspondence with FNAL on the project's needs, activities, and challenges.

Collaboration Chair

The Chair holds responsibility to the Collaboration in regards to organization and surveying the Collaboration's view and respecting the directions and interests of the group at large. The Collaboration Chair has the same rights and privileges as a Spokesperson within the Collaboration. The Chair's main function is to ensure that the direction of the experimental effort is following the interests of the Collaboration majority and to establish all required positions in the collaboration as well as ensure transitions in the Collaboration Coordinators and Working Group Leaders. The Chair shall organize the voice of the Collaboration and represent that voice to the experiment's Spokespeople, FNAL, and those outside the Collaboration. The Chair shall also attend the management meetings to represent the Collaboration interests.

Membership

The Collaboration is composed of Members, each of whom belongs to an Institution. (A member might have an affiliation with more than one Institution; such members will need to identify a primary Institution for the purposes of shift staffing and service work.)

There are two kinds of Collaboration Membership:

Full Membership

To be a full member contact the Collaboration Chair or one of the experiment's Spokespeople and request Full Membership. You must be willing to agree to the following

two commitments in order to maintain Full Membership status. Losing Membership status for more than a month can limit membership benefits.

1.) **Shifts Staffing:** The number of shifts will be assigned to each institution based on the number of Full Members in that institution. The Institution Representative is responsible for assigning shifts within their group. A shift schedule will be made available to the Collaboration. Any person may be a shift-taker and help fulfill an institution's shift quota if they meet the training requirements. During the run, the shifts for the experiment will be partitioned evenly among the institutions weighted by the number of full members.

2.) **Service Commitment:** Each Full Member must contribute to service work to the Collaboration. Examples of service work include: serving as a sub-system expert and being on call for that sub-system while running; contributing a major piece of hardware or work; being on-site and working on hardware for an extended period of time. Financial purchases can be counted, as well as any major vital contribution that satisfies the Chair. A memorandum of understanding will be made through the chair on behalf of the Collaboration with each institution on a set of roles and responsibilities for each full member. All appointed positions in the Collaboration can partially satisfy that person's service work.

Affiliated Membership

Contact the Chair or a Spokesperson and request Affiliated Membership. This allows you to be a participant on whatever level you like but with no set amount of shifts or service commitments. Affiliated Members cannot Opt-in to Physics Publications. Affiliated Members may Opt-in to NIM papers, Tech Notes, and other instrumental based posts and publications without the use of E1039 production data depending on their level of involvement.

Results and Publications

Approval of Talks and Preliminary Results: All and release of results shall pass a process of internal review before being allowed to be presented. This is true for talks, abstracts, proceedings and any form of publications.

Publications and Opt-in: No work should be submitted for publication without final approval by the Collaboration. A Working Group review will be formed for a review of each potential publication and should pass both the Work Group review and a collaboration review before submission. This is true for all technical and physics-based publications. If you are a Full Member you will be given the chance to Opt-in on all physics-based collaboration publications. Technical publications may publish with contributing authors only if requested at the Working Group review. The authors will be listed in alphabetical order with primary analyzers listed first as determined by the Analysis Coordinator and the writing group (graduate students will be given priority).

PI Board Meetings

We will hold regular board meetings with all PIs and or Institution Representatives. In these meetings will be discussed and determine the direction of the effort. This board is the primary deliberative group of the Collaboration. A quorum of 2/3 of the membership will be required to conduct business. At these meetings, reports will be given by the Spokespeople and the various Coordinators on the progress of the experiment and the Collaboration. These meetings will also be the occasion for collaboration business, conflict resolution, and the approval of results. The PI Board Meeting is organized and held by the Collaboration Chair.

Conflict Resolution

The Chair can open voting or arrange a committee to resolve any conflict at any time. To do this the Chair must call a PI Board Meeting and have 2/3 of all PIs to conduct a vote.

Removal of Spokespeople: There are places for only two Spokespeople on FNAL experiments, either of which can be removed at any time and replaced by any Collaboration member chosen for the role. In order to remove a Spokesperson, the motion must be suggested at a Collaboration Board Meeting with the Chair present. The Chair may then organize a PI meeting to vote for the Spokesperson to be removed by replacement. The Chair must usher the transition. Specially consideration must be taken when needing Spokesperson replacement. This type of transition brings great risk to the project, especially with the DOE. A transition of this nature should only be made in absolute necessity or with the permission of both sitting Spokespeople.

SpinQuest Service Commitments

The crediting system used here is Full Time Equivalent (FTE) which is defined by a 40 hour work week. We use the same definition as the DOE and FNAL for clarity and transparency.

In order to qualify for Full Membership along with shifts each institution must sign up for a service commitment equal to half-time of a Full Time Equivalent (0.5 FTE) per Full Member in that institution. These FTEs can be distributed in any way to the members within an institution. For example a professor and a postdoc together need 1 FTE which could be accredited in full by the postdoc being stationed at Fermilab and committing to one of the on site 1 FTE positions. However a single person can not be signed up for more than 1 FTE position without special consideration/permission (see Chair). It is also possible to have non-collaboration members or Affiliate Members provide service accredited to a particular institution.

All Coordinator positions are for 1 year unless worked out with the Chair and Service Coordinator. One can volunteer for any open service work or position, all are offered on a first come first serve basis. If conflict arises, the Chair may assign the position, call an election, or form a selection committee at any time. It is also important to know that each institution must maintain its commitments in order to preserve full membership. It is also possible to have extra FTEs served count towards future FTEs needed for an institution (not including trainee FTEs) or have past work FTEs counted to date but this should be worked out directly with the Chair.

Collaboration Coordinators

Spokesperson (1.0 FTE)

The SeaQuest spokespersons are the leaders of the project and are the primary links between the laboratory and the experiment. They are the principal sources of liaison with PPF, AD, TD, and SCD. They are responsible for establishing work priorities, from which the work plans are created, as well as developing work procedures that satisfy the lab-specified ESHQ criteria. Work priorities comprise the high-level Run-Plan and potential upgrades. The priorities are defined in consultation with the SpinQuest Institutional Board, the governing body of experiment and Collaboration Bylaws. The Spokespersons are also responsible for working together with the laboratory ESHQ personnel and the PPD Operations Coordinator to ensure that collaborations are appropriate trained and execute their work in accordance with established work procedures and hazard mitigation protocols. The spokespersons are also responsible for executing the operational plan of the experiment or delegating qualified personnel to do so as well as supervise the Run Coordinators. The spokespersons also make the appropriate arrangements to ensure that experiment is staffed as needed.

POSITION FILED Dustin Keller (dustin@virginia.edu) and Kun Liu (liuk.pku@gmail.com)

Collaboration Chair (0.5 FTE)

If the Chair is a Spokesperson then the Spokesperson just holds more responsibility to the Collaboration in regards to organization and to survey the Collaboration's view and respecting the directions and interests of the group at large. Otherwise the Collaboration Chair has the same rights and privileges as a Spokesperson within the Collaboration. The Chair is responsible for keeping the effort of the Collaboration organized and the ByLaws up to date. The Chair's main function is to ensure that the direction of the experimental effort is following the interests of the Collaboration majority and to establish all required positions in the collaboration as well as ensure transitions in the Collaboration Coordinators and Working Group Leaders. The Collaboration Chair is the Chair of the PI meeting where critical collaboration decisions are made via a PI vote. The Collaboration Chair also Chairs the Steering Committee. The Chair shall organize the voice of the Collaboration and represent that voice to the experiments Spokespeople, FNAL and outside the Collaboration. The Chair shall also attend the management meetings to represent the Collaboration interests. The Chair will also help organize collaboration meetings, keep track of Collaboration Full and Affiliated Members, keep or arrange others to keep the Biweekly Collaboration zoom meetings and hold meetings regarding Collaboration Business along with setting up any required voting platforms needed in the collaboration. The Chair's appointment is not fixed but will serve until passing to another collaborator. If more than one person is interested in the Chair or any position the present Chair will arrange a vote or set up a committee to establish an election or selection.

POSITION FILLED Dustin Keller (dustin@virginia.org)

Deputy Chair (0.5 FTE)

The Deputy Chair can hold IB meetings (and/or Steering Committee meetings) in the absence of the Collaboration Chair or request meetings without the Collaboration Chair present as needed. The responsibility of the Deputy Chair is to make sure the Collaboration view and interests are represented as a whole and to ensure there is good communication between all members of the collaboration. The Deputy Chair also helps organize the discussion of membership status of Institutions and individual Members, as necessary, especially the discussion of the introduction of new institutions. The Deputy Chair works with the Spokespeople to ensure that the direction of the experimental effort is following the interests of the Collaboration majority and to establish all required positions in the collaboration as well as ensure transitions in the Collaboration Coordinators and Working Group Leaders. The Deputy Chair may also attend the management meetings to represent the Collaboration interests.

POSITION FILLED Stephen Pate

Analysis Coordinator (0.5 FTE)

The Analysis Coordinator (AC) will help to lead and organize the physics analysis effort of the collaboration. This person will be responsible for making the analysis tools available to the collaboration. They will also hold regular (biweekly) analysis meetings which will initially focus on keeping track of the information gained from E906 and how to implement improvements and optimize the effort to reduce systematic uncertainty. After E1039 data becomes available the focus will shift to optimization of reconstruction and analysis and producing results of the Sivers Function. The Chair, PC and the AC will form physics working groups. The AC will track analysis efforts, and make regular reports to the Collaboration on the overall analysis effort from the

various working groups. The AC ensures that the members of each working group and persons pursuing publication follow the established protocol for the review, approval, and submission of all manuscripts for publication. The AC will also maintain a web page archiving the analysis software packages, analysis notes, and analysis progress as well as any technical and collaboration publications. The AC also serves as the Working Group Leader for the Sea Quark Sievers Function. The AC is also responsible for obtaining/maintaining resources for analysis, stable software (approved by Collaboration) and reconstruction.

The Analysis Coordinator assigns and manages a focused effort on the aspects of analysis:

- Simulations
- Systematics
- Dilution Factor
- Tracking/Reconstruction
- Off-line Computing
- Determining Alignment
- Off-line t0
- time-to-distant
- Data Management and Computing at FNAL

POSITION FILLED Zulkaida Akbar

Talk Coordinator (0.5 FTE)

The Talk Coordinator (TC) is responsible for overseeing the equitable distribution of speaking opportunities to Members of the Collaboration. The TC will look forward to future conferences and solicit invited speaker slots from conference organizers. Members who directly receive invitations from conference coordinators should coordinate their response with the TC. It is the TCs responsibility to keep the collaboration aware of this and to encourage institutions to send junior researchers (students and postdocs). The TC should communicate with collaboration members and labs and other funding opportunities to students with limited funding get the resources needed to give talks at upcoming events. All people interested in giving a talk or poster using the analysis or any results from E1039 at a conference should get approval from the TC before doing so. The TC will establish protocols for the review and approval of conference abstracts, presentations, and proceedings. A web page archiving all collaboration presentations will be maintained by the TC. The TC will also provide a meeting or phone meeting for practice talks upon request to get feedback from collaboration members.

When an analysis has reached an advanced stage and it is desired to make a presentation of preliminary results at a conference, the primary analyzers, in coordination with the Chair, Talks Coordinator, Analysis Coordinator and Physics Coordinator will form an open meeting to assess the quality and completeness. If it passes this initial review a presentation to the Collaboration will be given asking for "Preliminary Results" status for a Graph or Graphs of the results. A Graph of Preliminary Results should be as self-contained as possible, since it will likely appear in public archives of presentations and proceedings, and might be used by others outside the Collaboration. All such Graphs must contain the stamp "SpinQuest Preliminary" after approval.

The Collaboration will only approve a single Preliminary Result for any particular physics observable; it is expected that a Final Result will appear in a near-term publication. The Chair will coordinate the Collaboration evaluation in a Collaboration meeting. The Collaboration may vote to approve or reject with suggestions of improvement.

POSITION FILLED Wolfgang Lorenzon

Service Coordinator (0.5 FTE)

The Service Coordinator (SC) will oversee the assignments of the service work done for each of the full members and institutions. The SC may make use of the Fermilab ECL system to maintain lists of full collaboration members and contribution to service work and will also coordinate with the Shift Coordinator to make sure each institution has fulfilled its shift taking commitments. The SC will keep track of all service done in the Collaboration and organize the available service work to distribute. The SC will be in charge of assigning service work for each institution and accrediting each institution with work done as a running tally where FTEs are prorated for incoming or leaving Full Members on an annual basis. The SC will also present the status of this accreditation online and report to the Collaboration any losses in service that must be made up. The SC will report regularly to the Collaboration about service work that is needed by the collaboration and try to fit volunteers into their preferred jobs as well as assign members needing service to available service jobs. The SC in coordination with the Backup Run Coordinator will report in the Biweekly meeting as well as Collaboration meeting on updates to Service Work and work with the Backup Run Coordinator on what jobs are available for service. The SC will coordinate with the Chair to give a presentation on Service work and Service Tasks at every Collaboration Meeting. In the evaluation of performed Service Work the SC may choose anonymous senior collaborators to help evaluate the performed service of a given institution. An evaluation report of all institutional service commitments performed will be made available at each Collaboration meeting. The results of the institutional service commitments performed should be made public quarterly to let people know how they are doing. All service work FTEs have rollover value so a surplus and feed future lows.

POSITION FILLED Paul Reimer

Shift Coordinator (0.25 FTE)

The Shift Coordinator (ShC) is responsible for maintaining the shift schedule. The ShC may use the online Fermilab ECL system to maintain the schedule and arrange for a set of fixed shift at least one month ahead of time. In the case of cancellations the ShC is responsible for finding replacements to cover the shifts and reporting any changes to the Run Coordinator. The ShC is also responsible for making sure that the people on the schedule are qualified to take the shift. This means they should have taken the experiment shift training as well as the FNAL training needed. The Shift Coordinator is also responsible for making and up-keeping the experiment training materials for the collaboration. The ShC is responsible for coordinating shift trades and getting shift reminders to members about upcoming shifts.

POSITION FILLED Yoshiyuki Miyachi

Run Coordinator (1.0 FTE)

The Run Coordinator (RC) will be responsible for supervising the running of the experiment on-site at FNAL. This person will chair daily meetings to review the immediate progress and challenges of the experiment, will remind shift-takers of their duties and make sure optimal run conditions are being implemented. The RC is responsible for keeping the shift-takers updated on any configuration changes or changes to the run plan. The RC will keep a web-page with all the information from the daily meeting as well as expected run conditions, conditions for the beam and target, and monitoring. The RC must check the results of the online monitoring and continue to try to optimize the running conditions. The RC is responsible for checking the list of subsystems experts (provided by SyC) and contact info. Near on-site experts must be available at all times and the RC is responsible for making sure qualified experts are scheduled during all running times.

This position is expected to work with two people at a time to alternate off and on with positions lasting as long as the run (this position alternates with the Backup Run Coordinator in Monthly cycles or as previously arranged by both parties). Multiple people can hold this role but only one is in charge at a time.

Cryo-commissioning Run Coordinator: **POSITION FILLED** Misha Yurov

First Production Run Coordinator: **POSITION FILLED** Kun Liu

Outreach Leader (0.50 FTE)

The Outreach Leader and Outreach Coordinators (OutC) are responsible for helping the Talk Coordinator to solicit upcoming meetings and conferences to get speaker invitations in the Collaboration. The OutC is responsible for advertising the experiment for the sake of collaborator recruitment as well as publicizing the experiment on the largest scale platform available. The OutC will help the spokespeople organize an effort to attract more people into the project and help to publicize the project in social media to build interest and promote the experiment. The OutC may use crowdsourcing and *citizen science* in an attempt to involve the public and to expose non-scientists to Nuclear and Particle physics research. The OutC will connect volunteers in the collaboration to speak at Labs, Universities, two year colleges and high schools and other institutions to promote education and community involvement. The OutC primary objective is to help strengthen the Collaboration by attracting new Full and Affiliated Members and also to connect to the community to share what we are doing in our experiment and field. The OC will keep the Collaboration webpage and Collaboration Outreach materials up to date. This position can be fulfilled from any location. Several of these positions are available. All effort from the various OCs should be organized through the Outreach Leader. The leader position is (0.5 FTEs) while the various Outreach Coordinators are (0.25 FTEs) but can be weighted by scale of effort up to (0.5 FTEs).

Leader: **POSITION FILLED** Toshi-Aki Shibata

Coordinator: **MULTIPLE POSITIONS OPEN**

International Coordinator (0.5 FTE)

The International Coordinator coordinates contributions from outside the USA especially for overseas collaborators and overseas collaborating institutions, including money where the funding system is different from US, human-relations (for example younger students may need special assistance to stay longer at Fermilab as they don't have enough experience in English and life at US). The International Coordinator helps to bridge the needs on both ends between the international institutions and the collaboration. The International Coordinator helps to solicit upcoming meetings and conferences to get speaker invitations outside the USA. They are responsible for advertising the experiment for the sake of collaborator recruitment as well as publicizing the experiment on the largest scale platform available. The International Coordinator is also responsible for helping to organize meetings outside the USA for the Collaboration as needed as well as will help the spokespeople organize an effort to attract more people into the project and help to publicize the project in social media to build interest and promote the experiment. The International Coordinator must keep a calendar of international visitors coming to Fermilab and a list of resources international institutions have for the experiment. This information must be made available to the Spokespeople and Run Coordinators.

POSITION FILLED Shin'ya Sawada

Information Coordinator (0.25 FTE)

The Information Coordinator manages all public and collaboration access to information, manages all website and Fermilab web based utilities. This includes Shifts, Service Work, Calendar, Talks, Training materials, links to necessary information for the experiment or to get setup to work at FNAL. This also includes instructions for beginners and related project pages. The position manages all information that needs to be organized on a public or private webpage. Other Coordinators should provide the Information Coordinator with the required information to post.

POSITION FILLED Dipangkar Dutta

Meeting Coordinator (0.25 FTE)

The Meeting Coordinator manages Collaboration Phone meetings and helps to organize the SpinQuest Collaboration meeting and as well as help to prepare and send out the meeting agenda. The Meeting Coordinator is also in charge of finding speakers on topics of interest to the collaboration for seminars and Collaboration meetings. The meeting Coordinator should help find and arrange the venue for meetings and help to organize practice talks as needed for the collaboration. The Meeting Coordinator should also help to keep meeting information posted to the docdb and keep the collaboration informed of meeting dates and agendas. The Meeting Coordinator should also help to organize the session hosts for the meetings and remind presenters when their time to present is and what the necessary deadlines for posting slides and adhering to the talks policies with the Talks Coordinator.

POSITION FILLED Ishara Fernando

Systems Coordinator (0.25 FTE)

The Systems Coordinator (SyC) maintains a list of on-site and off-site experts for all subsystems. The SyC also coordinates training of experts by matching up scientists and students with experts that can train on a particular piece of hardware. The SyC provides the list of qualified experts to the RC. The SyC schedules the experts to be in close proximity to FNAL and provides all the necessary contact information to the RC. The SyC also maintains the list of fallback people or secondary contact for all instrumentation. There are two lists maintained by SyC, the Critical Systems list and the General Systems list. There must be a person assigned to each item with that person being stationed on-site (or near on-site) for the Critical Systems list. The SyC also should provide a calendar to FNAL and the Run Coordinator of who is onsite (or near) and who is coming throughout the experimental run. It's also important to keep track of any holes in the schedule or situations with less personal on a system that needs it. The SyC must also keep track of all hardware and instrumental needs from all the people in the Critical and General Systems. These people should report if there are needs from their system or anticipate needs so that the SyC can update the list of instrumental needs. The SyC should also keep track of the running costs of the experiment and report this to the collaboration regularly.

POSITION FILLED Ernesto Diaz

Critical Systems List:

- Beam: Carol Johnstone
- Target and Cryosystem: Dustin Keller
- NIM-Hodo: Forhad Hossian
- Chambers: Kei Nagai
- Prop. Tubes: Zhaohuizi Ji
- DAQ: Zongwei Zang
- FPGA Trigger: Minjung Kim
- Online Monitoring: Catherine Ayuso
- Spec/Beam Slow Controls: Astrid Morreale
- Target Slow Controls: Misha Yurov
- Beam Cerenkov: Rick Tesarek
- Fiber Hodoscope: Cristina Suarez
- Simulations and Recon: Abinash Pun
- Online Recons: Catherine Ayuso & Noah Wuerfel
- Onsite Computing: Hugo Leung

Physics Coordinator (0.5 FTE)

The Physics Coordinator is responsible for forming the physics working groups with the Analysis Coordinator and Chair. The PC will organize all information acquired from E906 in regards to reconstruction, analysis and systematic uncertainty to improve the potential for physics extraction of SpinQuest. A note should be generated to contain all this information which should be presented for the Analysis Coordinator and the Collaboration use. The PC will keep track of all the physics goals and assign the collaboration members to a particular physics working group. No work should be submitted for publication without collaboration approval, the PC helps to ensure this. The PC is also the one who orchestrates this approval with the Chair. The Working Groups and Collaboration must all give approval so a Committee will be formed for a review of

each potential publication and should pass both layers of the Review. The PC sets the time frame of these reviews and manages the internal correspondence between the authors and reviewers. The PC is also responsible for helping to organize and carry out phone meetings on analysis and helps the Analysis Coordinator with the responsibility for obtaining/maintaining resources for analysis, stable software (approved by collaboration), and reconstruction. In addition the PC should organize the reconstruction effort for the subsequent channels of interest. This role requires a dedicated effort to these responsibilities.

POSITION FILLED Kenichi Nakano

In order to publish you must be assigned to a Physics Working Group (there can be more added at anytime), which are listed below

- Day-1 Physics
- Sea Quark Sivers
- J/psi TSSA
- Open Charm and anti-charm
- Transversity
- Heavy Photon, Dark Higgs

The Physics Coordinator will assign responsibilities to each Physics Working Group having to do with Data Management, Simulations, and Main E1039 Analysis tasks. The Physics Coordinator must coordinate with the Analysis Coordinator and Chair to determine these tasks.

Backup Run Coordinator (0.5 FTE)

The Backup Run Coordinate helps the Run Coordinator with whatever is needed to help optimally run the experiment. There also are several on-site and off-site tasks and jobs that these coordinators should keep track of. Some short term and some ongoing. The Backup Run Coordinator (BRC) keeps track of these jobs and helps to find collaboration members to do them. These jobs may be part of service work so the BR Coordinator can help to determine the value of the work done for each job listed as a Service Task. This information should then be reported back to the Service Coordinator. The BR coordinator must solicit jobs from the Run Coordinator and Spokespeople and Collaboration Coordinators to compile a list of jobs and people to do them continually. This is especially critical for operations and jobs having to do with experimental running. They should then inform the Run Coordinator of upcoming jobs and jobs with no one assigned. The BRC should keep a website with the information on each job and the value of the job as service work for each posting as needed. The BRC should also oversee operations and the running of the experiment with the Run Coordinator and assist the Run Coordinator as needed. The BRC serves as backup to the Run Coordinator and will become Run Coordinator in the next iteration. The BRC should also designate the new BRC after they become RC.

POSITION FILLED Kei Nagai

Operations Coordinator (1.0 FTE)

The PPD SpinQuest Operations Coordinator is a position in the PPD Division office. The position is appointed by the PPD Division Head. The PPD SpinQuest Operations Coordinator is responsible for managing PPD resources for the SpinQuest experiment. The PPD SpinQuest Operations Coordinator will accept requests for labor and materials from the experiment's Spokespeople and allocate them within budgetary constraints based on priorities provided by the experiment's Spokespersons. The PPD SpinQuest Operations Coordinator, along with the Division Safety Officer, will ensure that all SpinQuest technical work performed in PPD buildings by employees, users, and contractors is conducted in a safe manner and follows the existing work planning and supervision protocols outlined by the experiment and FESHM. The PPD SpinQuest Operations Coordinator, the experiment's Chair, Deputy Chair, lead engineers and the Spokespeople will meet regularly to discuss safety, work planning and execution, resource allocation, and project budget.

POSITION FILLED Rick Tesarek

Working Group Leaders will be responsible for leading the effort for particular physics analyses as well as hardware specialty. These working group leaders are responsible for movement within the working groups and staffing the experiment with the expertise needed while running. Each physics-working group leader can focus its analysis in whatever way fitting for that physics scope but must offer a dedicated effort to the Sea Quark Sivers extraction. The physics working groups can decide the order of graduate students of that group's dedicated physics publications.

Instrumentation Working Commitments

(Critical) Requires an on-site presence commitment

Any position with 1.0 FTE listed below is a full time position (40 hrs/week) until the system is 100% operational at which point the position remains full time in service to the experiment on site as well as being on call for that system 24 hours a day. These experts are needed to fix complex problems on the experiment quickly to help us get up and running as soon as possible. These positions can be split between qualified members but these arrangements should be cleared with the Chair. All other positions have indicated the amount of FTE. These positions are all for one year but can be extended.

Target Group Leader (1.0 FTE)

POSITION FILLED Dustin Keller

Polarized Target Expert (1.0 FTE)

Polarized Target Expert:

Position requires expertise on all polarized target subsystems including:

- Liquid Helium and Liquid Nitrogen Cryogenics
- Operation of evaporation refrigerator

- Superconducting magnet
- Microwave system
- NMR and polarization measurements
- Target material handling and loading

Duties include operation and maintenance of the target system including all the subsystems, cryogenics, and optimization of polarization while the experiment is running. The target experts are responsible for keeping the target system up and running and making repairs as fast as possible when the system is not up and running. Also the target experts are responsible for taking calibration measurements of the polarization and making online assessments of the quality of the polarization calibration. The experts must be prepared to serve as local experts and will be on-call 24 hrs/day 7 days a week while being responsible for the system. Being on call will alternate between the other polarized target experts.

Requirements: Postdoc or graduate student resident at Fermilab during service as local target expert. Polarized target training is required (See D. Keller). Knowledge of LabView and slow controls will be useful. Understanding of the operation of oscilloscopes, RF electronics, and cryogenics is necessary. Ability to communicate clearly both written and orally.

Commitment: Be prepared to serve as a polarized target expert on site as needed for experiment. Provide what is needed by the Target Group Leader.

MULTIPLE POSITIONS OPEN

Polarized Target Trainee (0.25 FTE)

Will receive training on all polarized target subsystems including:

- Liquid Helium and Liquid Nitrogen Cryogenics
- Operation of evaporation refrigerator
- Superconducting magnet
- Microwave system
- NMR and polarization measurements
- Target material handling and loading

Duties include learning to operate and maintain the target system including operation of all the subsystems, cryogenics, and optimization of polarization while the experiment is running. Learn all you can about polarized targets and serve at least 15 polarized target shifts as well as serving as helper for polarized target experts for 1 month.

Requirements: Postdoc or graduate student resident at Fermilab during service as local target expert. Polarized target training is required (See D. Keller). Knowledge of LabView and slow controls will be useful. Understanding of the operation of oscilloscopes, RF electronics, and cryogenics is very helpful. Ability to communicate clearly both written and orally.

Commitment: Provide what is needed by the Polarized Target Expert and Target Group Leader.

Number of positions: Many

MULTIPLE POSITION AVAILABLE

Start Date: Immediate

Chambers Group Leader (1.0 FTE)

Lead a small group to commission and maintain the SpinQuest drift chambers including Station 1, 2, and 3.

Duties include operation and maintenance of the chamber system including operation of the high voltage, chambers, their gas system, electronics including the analog shaper/discriminator (ASDQ) level shifter boards and readout; set up measurement and documentation of system performance both in oral presentations and written technical notes; serve as local expert and may be on-call 24hrs/day 7 days a week while being responsible for the chamber system.

Requirements: Postdoc or graduate student resident at Fermilab. Basic understanding of electronic signal propagation and some experience with laboratory test equipment including multimeters and oscilloscopes. Knowledge of computers and computer programming in C, C++ and a variety of scripting languages will be useful. Understanding of the operation of scintillators, photomultiplier tubes (PMT) is desirable but not essential. Ability to direct and work with others. Ability to communicate clearly both written and orally.

Commitment: Minimum 1 year commitment. It is expected that the leader will train their replacement and serve as an expert consultant for the system when their replacement takes over system responsibility.

Number of positions: 1

POSITION FILLED Kei Nagai, (Lamiaa El-Fassi)

Start Date: Immediate

Chambers Group Member (1.0 FTE)

Work with chamber system leaders to commission and maintain the SpinQuest drift chambers including Station 1, 2, and 3.

Duties include developing detailed understanding of the chamber system including operation of the high voltage, chambers, their gas system, electronics including the analog shaper/discriminator (ASDQ) level shifter boards and readout. Assist in the measurement and documentation of system performance both in oral presentations and written technical notes. Serve as local expert and may be on-call 24hrs/day 7 days a week assisting the chamber system leader to maintain and operate the system.

Requirements: Graduate student resident at Fermilab. Basic understanding of electronic signal propagation, operation of proportional chambers and their electronics helpful, but not necessary. Programming experience in C, C++ and a variety of scripting languages is helpful. Desire to learn a detector system from bottom to top is essential.

Commitment: Minimum 1 year, may rise to leadership role.

MULTIPLE POSITIONS AVAILABLE

Hodoscope Group Leader (1.0 FTE)

Lead small group to commission and maintain the SpinQuest scintillator hodoscopes and NIM trigger, approximately 300 detectors.

Duties include testing detectors and high voltage systems to ensure signals are seen from all detectors up through discriminators up to time to digital converters (TDCs). Once all detectors are live, determine timing and efficiency of each detector using data collected from cosmic rays and beams. Document system performance in the form of oral presentations and technical notes. Once operation has been established with beam, serve as local expert on the E1039 hodoscope system and may be on-call 24hrs/day, 7 days a week when the experiment is taking beam data. May also include some involvement with the trigger to form primitive signals to be used for higher levels of the trigger.

Requirements: Postdoc or graduate student resident at Fermilab. Basic understanding electronic signal propagation and some experience with laboratory test equipment including multimeters and oscilloscopes. Knowledge of computers and computer programming in C, C++ and a variety of scripting languages will be useful. Understanding of the operation of scintillators, photomultiplier tubes (PMT) is desirable but not essential. Ability to direct and work with others. Ability to communicate clearly both written and orally

Commitment: Minimum 1 year commitment. It is expected that the leader will train their replacement and serve as an expert consultant for the system when their replacement takes over system responsibility.

Number of Positions: 1

POSITION FILLED Forhad Hossian

Start Date: Immediate

Hodoscope Group Member (1.0 FTE)

Work with hodoscope system leader to commission and maintain the SpinQuest scintillator hodoscope arrays.

Duties include developing detailed understanding of the hodoscope system including operation of the high voltage, photomultiplier tubes, electronics, NIM trigger and readout. May be required to develop knowledge of trigger primitives developed by the hodoscope planes. Assist in the documentation of system performance both in oral presentations and written technical notes. Serve as local expert and may be on-call 24hrs/day 7 days a week assisting the hodoscope system leader to maintain and operate the system.

Requirements: Graduate student resident at Fermilab. Basic understanding of electronic signal propagation, operation of scintillator, photomultiplier tubes helpful, but not necessary. Programming experience in C,C++ and a variety of scripting languages is helpful. Desire to learn a detector system from bottom to top is essential.

Number of Positions: up to 2

MULTIPLE POSITIONS AVAILABLE

Start Date: Immediate

Fiber Hodoscope Group Leader (1.0 FTE)

Lead a small group to commission and maintain the SpinQuest SiPM hodoscopes.

Duties include testing detectors to ensure signals are seen from all detectors up through discriminators up to time to digital converters (TDCs). Once all detectors are live, determine timing and efficiency of each detector using data collected from cosmic rays and beam. Document system performance in the form of oral presentations and technical notes. Once operation has been established with beam, serves as local expert on the E1039 hodoscope system and may be on-call 24hrs/day, 7 days a week when the experiment is taking beam data.

Requirements: Postdoc or graduate student resident at Fermilab. Basic understanding electronic signal propagation and some experience with laboratory test equipment including multimeters and oscilloscopes. Knowledge of computers and computer programming in C, C++ and a variety of scripting languages will be useful. Ability to direct and work with others. Ability to communicate clearly both written and orally

Commitment: Minimum 1 year commitment. It is expected that the leader will train their replacement and serve as an expert consultant for the system when their replacement takes over system responsibility.

Number of Positions: 1

POSITION FILLED Cristina Suarez

Fiber Hodoscope Group Member (1.0 FTE)

Work with hodoscope system leader to commission and maintain the SpinQuest fiber hodoscope arrays.

Duties include developing detailed understanding of the hodoscope system including operations and testing, associated electronics, and readout. May be required to develop knowledge of trigger primitives developed by the hodoscope planes. Assist in the documentation of system performance both in oral presentations and written technical notes. Serve as local expert and may be on-call 24hrs/day 7 days a week assisting the hodoscope system leader to maintain and operate the system. This system is an important part of the SpinQuest detector and is the essential detector for Dark Sector physics.

Requirements: Graduate student resident at Fermilab. Basic understanding of electronic signal propagation, operation of scintillator, photomultiplier tubes helpful, but not necessary. Programming experience in C,C++ and a variety of scripting languages is helpful. Desire to learn a detector system from bottom to top is essential.

Number of Positions: up to 2

MULTIPLE POSITIONS AVAILABLE

Start Date: Immediate

Proportional Tube Expert (1.0 FTE)

Work with Proportional Tube setup for commission and maintain during the SpinQuest run.

Duties include developing detailed understanding of the proportional system including operations maintenance, electronics and readout. Assist in monitoring the health and optimization checks as well as preparation of the documentation of system performance both in oral presentations and written technical notes. Serve as local expert and be on-call 24hrs/day 7 days a week to keep the proportional tubes and operational and optimized.

Requirements: Graduate student or Postdoc resident at Fermilab during running. Programming experience in C,C++ and a variety of scripting languages is helpful. Desire to learn a detector system from bottom to top is essential.

POSITION FILLED Helen Ji

Cherenkov Expert (1.0 FTE)

Expert on site to commission and maintain the SpinQuest Cherenkov.

Duties include operation and maintenance of the Cherenkov system. Setup measurement and documentation of system performance both in oral presentations and written technical notes. Serve as a local expert and to be on-call 24hrs/day 7 days a week while being responsible for the system.

Requirements: Postdoc or graduate student resident at Fermilab. Basic understanding electronic signal propagation and some experience with laboratory test equipment including multimeters and oscilloscopes. Knowledge of computers and computer programming in C, C++ and a variety of scripting languages will be useful. Ability to direct and work with others. Ability to communicate clearly both written and orally.

Commitment: Minimum 1 year commitment. It is expected that the expert will train their replacement and serve as an expert consultant for the system when their replacement takes over system responsibility.

POSITION FILLED Rick Tesarek

DAQ Expert (1.0 FTE)

Expert on site to commission and maintain the SpinQuest data acquisition (DAQ). This includes living nearby to FNAL so you can be onsite fast if needed.

Duties include operation and maintenance of the data acquisition system. Setup, test and prepare documentation of system performance both in oral presentations and written technical notes. It will be necessary to provide a note on recovery for shift takers. Serve as local expert and may be on-call 24hrs/day 7 days a week while being responsible for the DAQ.

Requirements: Postdoc or graduate student resident at Fermilab. Basic understanding electronic signal propagation and some experience with laboratory test equipment including multimeters and oscilloscopes. Knowledge of computers and computer programming in C, C++ and a variety of scripting languages will be useful. Ability to communicate clearly both written and orally.

Commitment: Minimum 1 year commitment. It is expected that the expert will train their replacement and serve as an expert consultant for the system when their replacement takes over system responsibility.

Number of Positions: 2 (one position can be part time or in training)

POSITION FILLED Zongwei Zang

Start Date: Immediate

FPGA Trigger Expert (1.0 FTE)

Expert on site to commission and maintain the SpinQuest trigger setup.

Duties include operation, maintenance and optimization of the trigger system. Setup, test and prepare documentation of the system's performance, both in oral presentations and written technical notes. Serve as local expert and be on-call 24hrs/day 7 days a week while being responsible for the chamber system.

Requirements: Postdoc or graduate student resident at Fermilab. Basic understanding electronic signal propagation and some experience with laboratory test equipment including multimeters and oscilloscopes. Knowledge of computers and computer programming in C, C++ and a variety of scripting languages will be useful. Ability to work with others. Ability to communicate clearly both written and orally

Commitment: Minimum 1 year commitment. It is expected that the expert will train their replacement and serve as an expert consultant for the system when their replacement takes over system responsibility.

Number of Positions: 1

POSITION FILLED Minjung Kim

Online Monitoring Expert (0.5 FTE)

Experts may or may not be on site but must keep an online Monitoring setup and running at all times for SpinQuest data collection.

Duties include keeping the software running and optimized to monitor the data as its being collected and setting up utilities for shift workers to test data quality quickly and record monitoring histograms. Setup, test and prepare software for quick on-line analysis. Prepare documentation of system performance reports both in oral presentations and written technical notes.

Requirements: Understanding online reconstruction for SpinQuest and the experimental setup at SpinQuest including detector package, trigger and DAQ Knowledge of computing fast running executables in C, C++ and a variety of scripting languages. Ability to communicate clearly both written and orally.

Commitment: Minimum 1 year commitment. It is expected that the expert will train their replacement and serve as an expert consultant for the system when their replacement takes over system responsibility.

Number of Positions: 1

POSITION FILLED Catherine Ayuso

Onsite Computers (0.5 FTE)

Experts must be onsite to maintain all onsite SpinQuest computer systems and keep systems running at all times for SpinQuest data collection.

Duties include maintaining all SpinQuest onsite computers and operating systems and updates as well as keeping the software running and optimized to monitor the data as its being collected and setting up utilities for shift workers to test data quality quickly and record monitoring histograms. Setup, test and prepare software for quick on-line analysis. Prepare documentation of system performance reports both in oral presentations and written technical notes. These systems are critical to both online and offline analysis and the Onsite Computer Experts is responsible for both sets of systems.

Requirements: Understanding Linux and windows systems at NM4 for the SpinQuest monitoring and analysis effort as well as some knowledge of the experimental setup at SpinQuest including detector package, slow controls systems, trigger and DAQ Knowledge of computing fast running executables in C, C++ and variety of scripting languages. Ability to communicate clearly both written and orally.

Commitment: Minimum 1 year commitment. It is expected that the expert will train their replacement and serve as an expert consultant for the system when their replacement takes over system responsibility.

Number of Positions: 1

POSITION FILLED Hugo Leung

Offline Software Expert (1.0 FTE)

Experts may or may not be on site but must keep offline software for analysis, reconstruction, and simulations setup and running at all times for the SpinQuest analysis effort.

Duties include keeping the software running and optimized for processing the data through reconstruction and even building of the data collected from the experiment as well as setting up software utilities for the analysis effort. Have a software repository so that users can check out SpinQuest simulations and other tools. Setup, test and prepare software for the analysis effort as needed. The Offline Software Expert will also hold biweekly meetings until the effort has fully matured at which point holding meetings as needed is OK. Prepare documentation for simulation and reconstruction as well as report updates both in oral presentations and written technical notes.

Requirements: Understanding online reconstruction for SpinQuest and the experimental setup at SpinQuest including detector package, trigger and DAQ Knowledge of computing fast-running

executables in C, C++ and variety of scripting languages. Ability to communicate clearly both written and orally.

Commitment: Minimum 1 year commitment. It is expected that the expert will train their replacement and serve as an expert consultant for the system when their replacement takes over software responsibility.

Number of Positions: 1

POSITION FILLED Abinash Pun

Slow Controls Expert (1.0 FTE)

Knowledge of all slow control systems including all the software for monitoring and controlling specifically the detector systems as well as DAQ and database for the data stream. The experts must be prepared to serve as local experts and must be on-call 24hrs/day 7 days a week while being responsible for the slow controls and data recording system of the slow controls data stream. Develop as needed all slow controls and monitoring software for experiment and keep software running during commissioning and production. Provide documentation of this software and recovery steps for shift workers.

Requirements: A detailed knowledge of databases and slow controls will be needed. Understanding of all hardware data output to be monitored is necessary. Ability to communicate clearly both written and orally.

Commitment: Be prepared to serve as a polarized target expert on site as needed for experiment. Provide what is needed by the Target Group Leader.

POSITION FILLED Astrid Morreale

Target Slow Controls Expert (1.0 FTE)

Knowledge of all slow control systems including all the software for monitoring and controlling the target and detector systems as well as DAQ and database for the data stream. The experts must be prepared to serve as local experts and must be on-call 24hrs/day 7 days a week while being responsible for the slow controls and data recording system of the slow controls data stream. Develop as needed all slow controls and monitoring software for experiment and keep software running during commissioning and production. Provide documentation of this software and recovery steps for shift workers. Extensive knowledge of LabView and integrated handlers for slow controls and cryogenic monitoring systems is required.

Requirements: Postdoc or graduate student resident at Fermilab during service as local Slow Controls Expert. Detailed knowledge of LabView, database and slow controls will be useful. Understanding of all hardware data output to be monitored is necessary. Ability to communicate clearly both written and orally.

Commitment: Be prepared to serve as a polarized target expert on site as needed for experiment. Provide what is needed by the Target Group Leader.

POSITION FILLED Misha Yurov

Collaboration Coordinators (with backups listed)

| Run Co. | Physics Co. | Analysis Co. | System Co. | Shift Co. | Meeting Co. | Talks Co. | Info Co. | International Co. | Outreach Co. | Service Co. | Chair and Deputy Chair |
|-------------------------------|-------------|--------------|------------|------------|-------------|-----------------|----------|-------------------|--------------|-------------|------------------------|
| M. Yurov | K. Nakano | Z. Akbar | E. Diaz | Y. Miyachi | I. Fernando | W. Lorenzon | D. Dutta | S. Sawada | T.A. Shibata | P. Reimer | D. Keller |
| K. Liu Backup: K. Nagai | Z. Akbar | K. Nakano | K. Liu | M. Kim | D. Keller | V. Papavasiliou | S. Pate | T.A. Shibata | E. Yeats | D. Keller | S. Pate |

Critical Systems Experts (with backups listed)

| Slow Controls | Wire Chambers | Hodo+NIM | Beam Cerenkov | Prop. Tubes | Target Controls | Offline Recon | Online Recon | FPGA Trigger | Onsite Computers | DAQ | Fiber Hodo |
|---------------|---------------|------------|---------------|-------------|-----------------|---------------|---------------|--------------|------------------|------------|------------|
| A. Morreale | K. Nagai | F. Hossain | R. Tesarek | H. Ji | M. Yurov | A. Pun | C. Ayuso | M. Kim | H. Leung | Z. Zang | C. Suarez |
| (M. Yurov) | N. Chaminda | (L. Diaz) | | (A. Arora) | D. Ruth | Z. Akbar | (N. Chaminda) | N. Wuerfel | P. Reimer | (H. Leung) | (K. Liu) |
| P. Reimer | L. El Fassi | | | | Z. Akbar | | K. Nakano | | | P. Reimer | M. Liu |
| | | | | | A. Arora | | | | | | |
| | | | | | V. Bandara | | | | | | |

Polarized Target subsystems (with backups listed)

| Microwaves and Electronics | NMR | Magnet/IV | Roots/VP | Target Material | QT-Liq | Actuator | Temperature Measure | Fridge | Cryocontrols |
|----------------------------|-----------|-----------|------------|-----------------|---------------|------------------|---------------------|-----------------|--------------|
| I. Fernando | M. Yurov | Z. Akbar | A. Arora | L. Diaz | UVA-R S | V. Bandara | L. Diaz | E. Diaz | V. Bandara |
| (M. Yurov) | (D. Ruth) | (F. Diaz) | (M. Yurov) | (Z. Akbar) | (A. Arora) | (I. Fernando) | (F. Diaz) | (V. Bandara) | D. Perera |
| Z. Akbar | | (D. Ruth) | | | | | | A. Arora | Harsha |

Working Group

| Target Controls | Trigger | Online Recon | Tracking+Sim | Analysis | Day One | Chambers | Hodo + NIM | Target | Prop. Tubes | DAQ | Slow Controls |
|-----------------|--------------|--------------|--------------|-------------|-------------|-------------|------------|-------------|-------------|-----------|---------------|
| M. Yurov | M. Kim | C. Ayuso | A. Pun | Z. Akbar | K. Nakano | K. Nagai | F. Hassian | D. Keller | H. Ji | Z. Zang | A. Morreale |
| D. Perera | N. Wuerfel | K. Nakano | Z. Akbar | L. Diaz | S. Pate | L. El Fassi | C. Suarez | M. Yurov | A. Arora | H. Leung | M. Yurov |
| V. Bandara | I. Lavrukhin | R. Tesarek | K. Nakano | A. Arora | W. Lorenzon | Y. Goto | M. Liu | Z. Akbar | L. Diaz | Y.C. Chen | P. Reimer |
| R. Lockhart | W. Lorenzon | L. El Fassi | C. Ayuso | F. Hossain | P. Reimer | Y. Miyachi | L. Diaz | A. Arora | Q. Xu | P. Reimer | K. Nakano |
| Z. Akbar | D. Dutta | N. Chaminda | F. Hossain | I. Fernando | J.C. Peng | C. Brown | S. Pate | L. Diaz | | | |
| E. Perez | | A. Pun | N. Wuerfel | N. Chaminda | L. El Fassi | K. Nakano | Isenhower | D. Ruth | | | |
| D. Ruth | | N. Wuerfel | I. Lavrukhin | C. Ayuso | C. Ayuso | C. Ayuso | C. Brown | I. Fernando | | | |
| A. Arora | | | N. Chaminda | H. Leung | Z. Akbar | N. Chaminda | | | | | |
| | | | | K. Nagai | N. Chaminda | | | | | | |

Service Tasks (FTE assigned by Service Coordinator):

- Light cleaning and organization

- Beamline work
- Detector electronics
- Shielding work
- Piping and assembly
- Writing documentation: Online and printable documents, editing, safety checks
- Need people to train to be next generation experts: Drift Chambers, DAQ, Trigger, ...(students, postdoc for every station.)

Institutional Purchase:

List of items available. Please see Chair for inquiry and accreditation towards service commitments.

SpinQuest Signatures

The Spokespeople are the official contacts and are responsible for forwarding all pertinent information to the rest of the group, arranging for their training and with the help of the Institutional Board orange and facilitating the Collaboration structure, roles and responsibilities.

Spokespeople of E1039: _____

The following SpinQuest Collaboration Members have reviewed this MOU:

SpinQuest Chair: _____

SpinQuest Deputy Chair: _____

| Institution: | Signature/Date: |
|--------------|-----------------|
| _____ | |
| _____ | |
| _____ | |
| _____ | |

