UNIVERSITY
OF COLORADO

Alysia D. Marino

Assistant Professor
University of Colorado Boulder
Department of Physics
UCB 390
Boulder, CO, 80309, USA
Phone: +1 (303) 492-7183
E-mail: amarino@colorado.edu

January 30, 2015

To: Tomasz Matulewicz, Peter Seyboth, and Marek Gazdzicki

Dear NA61 Collaboration Board,

This is a letter of intent from the Neutrino Physics Group from the University of Colorado Boulder to join the NA61/SHINE collaboration.

Members Joining

- Alysia Marino, faculty, 30% effort on NA61 (co-group leader)
- Eric Zimmerman, faculty, 25% effort on NA61 (co-group leader)
- Yoshikazu Nagai, Postdoctoral Researcher, 75% effort on NA61
- Scott Johnson, PhD student, 75% effort on NA61
- Brant Rumberger, PhD student, 100% effort on NA61

Group Experience and Interests

Eric Zimmerman has been on the faculty at the University of Colorado since 2001, where he has worked primarily on the MiniBooNE (Fermilab E898/944) and T2K neutrino physics collaborations. Previous efforts included Fermilab experiments E815 (NuTeV) as a postdoc at Columbia, and E799/E832 (KTeV) as a graduate student at the University of Chicago. Zimmerman with his group at Colorado designed and constructed the second focusing horn (and a replacement horn) for the T2K beam. On T2K, his postdocs and student have contributed heavily to the ν_e appearance analysis and the development of a new event reconstruction algorithm for Super-Kamiokande events for T2K analysis.

Alysia Marino has been working in neutrino physics for the past 15 years. Her PhD thesis was an analysis of the solar neutrino fluxes in the second phase of the Sudbury Neutrino Observatory, where NaCl was added to the heavy water to increase the sensitivity to neutral current interactions. She was a Research Associate at Fermilab on the MINOS experiment and in 2006 she joined the T2K collaboration as a Research Associate at the University of Toronto. There she led the effort to design, produce, and install an innovative beam monitor that uses optical transition radiation to determine the position and shape of the T2K proton beam, just before it strikes the target. Since Marino's move to Colorado as a faculty member in Jan 2009, she has continued to work on T2K, but her focus has shifted to the ND280 off-axis near detector,

and in particular to the pi-zero subdetector (P0D) of the near detector.

Yoshikazu Nagai is a new postdoctoral researcher in the group, with previous HEP experience on CDF and ATLAS. Scott Johnson is a PhD student, who has already contributed to the flux predictions and uncertainties on T2K and to the residual corrections in the NA61 calibration chain. He has also been working to cross check the thin target analysis using the new Shine framework.

The Colorado group has been involved in the US effort to construct a future high-intensity Long-Baseline Neutrino Experiment from Fermilab since 2009. The Colorado LBNE effort has concentrated on beamline simulations and measurements. The group has focused on planning for in-situ measurements, specifically on the development of beam monitoring of muons in the region downstream of the absorber, and on pursuing additional ex-situ constraints on hadron production (which will hopefully soon include high-energy data from NA61/SHINE).

Proposed Contributions to NA61/SHINE

The Colorado group is especially interested in making hadron production measurements that will benefit the upcoming LBNE experiment. This includes taking data for hadron production from both protons and pions on suitable targets (such as canon, steel, and aluminum), at higher indecent beam energies of 60-120 GeV. We are also interesting in attempting to extract lower energy 30 GeV pion+carbon data from the existing T2K thin target data sample, as presented at NA61 meetings by Scott Johnson.

Over the next two years, the group expects to play a major role in the hardware with the construction of one or more additional TPCs to add additional tracking in the forward region, which is important at higher energies. We plan to add this tracker into the simulation framework. We plan to continue to assist with the calibration of NA61 data, and plan to analyze data that will be relevant to LBNE. It is expected that graduate students Johnson and Rumberger will analyze NA61 data for their PhD theses. As members of the NA61/SHINE collaboration, we expect to contribute yearly to the common fund and to participate in data-taking shifts. We plan to attend the collaboration meetings in-person (or by video when it is not possible to travel).

We look forward to working with the NA61/SHINE collaboration and appreciate your consideration of this letter.

Sincerely,

Alysia D. Marino
Eric D. Zimmerman