



UNIVERSITY OF PITTSBURGH

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To: Tomasz Matulewicz, Peter Seyboth, and Marek Gazdzicki

Dear NA61 Collaboration Board,

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

Members Joining

- Donna Naples, faculty, 20% effort on NA61 (co-group leader)
- Vittorio Paolone, faculty, 40% effort on NA61 (co-group leader)
- Nick Graf/TBD, Postdoctoral Researcher, 50% effort on NA61
- Ben Messerly, PhD student, 50% effort on NA61

These FTE fractions are only for the upcoming year (2015). It is anticipated that the efforts will increase over the subsequent years to one full FTE both for a postdoctoral researcher and PhD student.

Group Experience and Interests

Vittorio Paolone has been on the faculty at the University of Pittsburgh since 1997 and Donna Naples since 2000 and formed the core of the neutrino effort at Pittsburgh. The focus of the neutrino groups experimental efforts over the last several years has been on measuring neutrino properties through oscillation phenomena and on improving our understanding of their interactions. Our ongoing efforts on MINOS/MINOS+ and T2K helped to establish the current state of neutrino mixing matrix. Ongoing working on the MINER ν A experiment has contributed to improved understanding of neutrino interaction physics and the details of the interaction final state which will be used to reduce systematic errors in the extraction of neutrino oscillation parameters. This past year we joined the MicroBooNE experiment which continues our research themes and adds contact to liquid argon TPC technology R&D. Our ongoing research program positions us well to have an important role in the future short and long-baseline neutrino programs at Fermilab (ELBNF). Our early involvement in ELBNF included work on Near Detector requirements and initial design. However a focus of the Pittsburgh neutrino group over the next few years will be to improve beam flux predictions specifically using external hadro-production data to be collected using the CERN NA61 experiment.

Nick Graf is a new postdoctoral researcher in the group, with previous HEP experience on MIPP and MINOS. On MIPP Graf refurbished, assembled and tested the Ring Imaging Cherenkov (RICH) detector with 2200 photomultiplier tubes. He also developed software for monitoring the status of the experiment (i.e. temperature, gas pressures, magnet currents, etc).

Ben Messerly is a new graduate student working under the guidance of Paolone on MINER ν A studying neutrino interaction processes resulting in pions in the final state. Pion production is a significant background to ν_e appearance oscillation measurements. However Messerly, as part of his thesis work, will be involved with NA61 and work on integrating NA61 measurements into an improved neutrino flux prediction for MINER ν A. His work on NA61 will reduce the errors on his absolute cross section measurements.

Proposed Contributions to NA61/SHINE

The Pittsburgh group is especially interested in making hadron production measurements that will benefit MINER ν A and the upcoming ELBNF experiment. This includes taking data for hadron production from both protons and pions on suitable targets (such as carbon, steel, and aluminum), at incident beam energies of 30-120 GeV/c.

The group expects to continue to play a major role in the DRS electronics hardware upgrade. We expect to assist with the calibration of NA61 data (Graf), and plan to analyze data that will be relevant to MINER ν A and ELBNF. Postdoc Nick Graf's future responsibilities along with Naples will be to integrate these measurements into improved flux predictions for ELBNF. It is anticipated that graduate student Messerly will analyze NA61 data for his PhD thesis and continue working and being trained as a TPC gas expert. 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) and the pertinent weekly meetings by video.

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

Sincerely,

Donna Naples
Vittorio Paolone