Gluon Saturation Search in the Small Bjorken-x Region Using the LHCb Experiment.

A Data Management Plan created using DMPTool

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Data types and sources

The data generated in this proposed research is composed of 1) technical advantages in instrumentation in a high radiation environment and fast data acquisition and 2) fundamental science advances. Most data will be public, be preserved for future instrumentation applications and further development of particle production in high energy collisions, and sharing will be beneficial for the field. Exceptions are reserved for technical details and property information of the electronics, which is reserved to the LHCb collaboration, and preliminary results reserved to the principal investigator for data checking and reliability.

Technical and scientific results of this research will be published in open search journals, presented in conferences as posters or orally, and be available in the collaboration and LANL web sites. The expected data generated by this proposed research is;

1- test results of radiation hardness and light attenuation of scintilattor fibers and bars: data will be published in thecnical reports and jornals

2- scintillating fiber-clean fiber and clean fiber-SiPM coupling technique: technique will be described in thecnical reports and jornals

3- data aqcuisition performance: result will be available in technical reports and journals, details of the electronic boards are reserved to the LHCb collaboration and may contain property containt.

4- analysis technique to select and measure Compton processes in high energy collisions: will be described in scientific journals

5- report on a possible discover of gluon saturation regime or veto kinematic region: scintific information will be available in open scientific journals

Content and format

Annotations during th reserach can be presented in LHCb and LANL groups for discussions. This includes technical findings, analysis procedures and software developments.

The software produced during this research will be available only for LHCb collaboration and LANL group the principal investigator participates.

According to LANL rules techinal and scientific publications may be communicated internally before submission.

Sharing and preservation

Transient data will be stored in the LHCb data management sysytem described in the publication linked at http://iopscience.iop.org/article/10.1088/1742-6596/396/3/032023. The abstract of the publications says:

"The LHCb Data Management System is based on the DIRAC Grid Community Solution. LHCbDirac provides extensions to the basic DMS such as a Bookkeeping System. Datasets are defined as sets of files corresponding to a given query in the Bookkeeping system. Datasets can be manipulated by CLI tools as well as by automatic transformations (removal, replication, processing). A dynamic handling of dataset replication is performed, based on disk space usage at the sites and dataset popularity. For custodial storage, an on-demand recall of files from tape is performed, driven by the requests of the jobs, including disk cache handling."

Data stored in the LHCb DIRAC sysytem will be group protected. A decision in share scientific results and procedures will be made in conjunction with LHCb collaboration after internal discussion and approval sessions. Techinical findings will be submitted to the LHCb collaboration approval before publication. Internal LHCb and LANL web sites will report the progress of the research. These web pages will be accessed by LHCb collaborators and LANL physics division participants.

Public data corresponding to the result of first analysis of data previously collected by LHCb can start to be available in the first year after the beginning of this project. Technical results are expected to be reported two years after the beginning of this project.

Property software will be used to program FPGAs in the electronic boards. The FPGA code will be stored in LANL standalone computers. The licenses can be already available at LANL or will be purchased by the project.

Specialized LANL internal sites provides public or group protected access to data produced by the LAB or collaborattors. These sites will be used to inform the progress of the project and final results. Journal publications and their websites will be the main procedure to access final findings of this project.

Protection

All computer sysytems where the data will be managed are user and group protected. Only LHCb collaborattors have access to the data storage disks where the transient data will be sitting in. Part of the work will also be stored in the principal investigator computer at LANL with no external access.

Rationale

Technical finds can impact how to develop nuclear physics instrumentatio in many levels of radiation enviroments. The analysis techniques developed in this research can be utilized in future experiments in other facilities. The discover of constraints for the gluon saturation regime in proton and nucleus collisions will provide a new tool to calculate and predict nuclear behavior in high energy collisions with umpredictable extensions in the field.

Software & Codes

- FPGA code used in the readout and front-end electronics

- online monitoring of data acquisition

- offline particle tracking and kinematic reconstruction

- detectro and physics simulations

- data reduction, selection and analysis in order to provide the final scientific result