

Titolo: “Upgrade del rivelatore LUCID per la misura di luminosità ad HL-LHC e ricerca di neutrini pesanti in modelli Left-Right simmetrici.”

Titolo (EN): Upgrade of the LUCID Detector for Luminosity Measurement at the HL-LHC and Search for Heavy Neutrinos in Left–Right Symmetric Models

LUCID has been and currently is the reference ATLAS detector for measuring luminosity. The current detector will not be suitable for HL-LHC due to the increased pile-up and radiation levels. An upgrade of the LUCID detector is currently being defined, using the data collected during LHC Run-3 by several prototypes based on different technologies: photomultipliers, optical fibers and LGAD sensors. A decision on the final setup, possibly using a balance of different and complementary technologies, must be made and the detector and its readout electronics be built by the end 2029.

In addition, the project includes the analysis of ATLAS data in the search for heavy neutrinos within Left-Right Symmetric Models. These models postulate the restoration of parity at high energies and predict a rich spectrum of new particles that could be accessible at the LHC energy scale. The goal is to advance the analysis to the publication stage, including the determination of limits and a thorough evaluation of the relevant systematic uncertainties.

Activity plan: candidate is expected to:

- participate to the data analysis of the LUCID prototypes;
- participate to the data taking beam tests at international and national laboratories;
- participate to the definition and commissioning of the final setup of the ATLAS luminometer;
- participate to the analysis for the search of heavy neutrinos in Left-Right Symmetric Models, including the limit settings in the absence of signal events and the embedding of systematic effects.

Required knowledge, skills, and abilities:

- Ph.D. in particle or applied physics.
- Experience developing software for particle physics experiments.
- Expertise in C/C++ and other computer languages.
- Familiarity with computer operating systems such as Unix/Linux and Windows.

Preferred knowledge, skills, and abilities:

- Experience in physics measurements or detector performance studies in a particle physics experiment.
- Knowledge of data acquisition systems.
- Ability to work in a large collaboration.
- Hands-on problem solving skills and excellent verbal and written communication skills.