Contribution ID: **403**   Type: **Poster**

Characterizing MICROMEGAS Atom Detection Capabilities at the INFN Pisa Ion Beam Facility

Friday, 31 May 2024 15:53 (1 minute)

An Ion Beam Facility (IBF) has been set-up at the INFN laboratory in Pisa with specific intent of having a test bench for studying gas detectors that detect low-energy ionizing radiation under low-pressure conditions (100 mbar and below). Developed by the Pisa research group engaged in the SWEATERS and UTMOST projects, the IBF is currently being used to highlight the sensitivity of a MICROMEGAS detector for the observation and study of light ions (H, He, O) with energy below 5 keV.

The facility employs a commercial sputtering ion source in an unconventional manner, prioritizing low current, high stability, and precise beam focusing to cover the distance to the detector under test. Along the beam line, the differential pressure technique and precise gas tightness of the detector enable a detailed study of atom-gas molecule interactions. The facility includes a monitoring system for residual gas contaminants, which might otherwise contribute to diffuse background and secondary beams formations overlapping the main monoenergetic beam signal. A sophisticated positioning system, offering six degrees of freedom, ensures precise positioning of the detector on the beamline. Continuous gas renewal in the detector's sensitive volume is achieved through a gas distribution system. Monitoring of thermodynamic parameters affecting the detector response and a sensor-based cooling system for temperature control improve the experimental accuracy.

This IBF represents an active playground, at INFN Pisa, for the future developments of gas detectors to be operated in low-pressure regime and for low energy ionization radiation. In addition, it is of great importance and interest for specific applications where each detector component and innovative experimental methodologies must be carefully tested. Thanks to this facility, a precise characterization of a MICROMEGAS detector was possible in recent years. Today it represents a cornerstone of a robust and well-established research and development program for future detector technologies.

Collaboration

Role of Submitter

I am the presenter

Primary authors: FORESI, Andrea (Università di Pisa / INFN); MOGGI, Andrea (Istituto Nazionale di Fisica Nucleare (INFN)); AVANZINI, Carlo (Istituto Nazionale di Fisica Nucleare (INFN)); MAGAZZÙ, Carlo (Istituto Nazionale di Fisica Nucleare (INFN)); MORSANI, Fabio (Istituto Nazionale di Fisica Nucleare (INFN)); PILO, Federico (Istituto Nazionale di Fisica Nucleare (INFN)); FRASCONI, Franco (Istituto Nazionale di Fisica Nucleare (INFN)); BALESTRI, Gabriele (Istituto Nazionale di Fisica Nucleare (INFN)); BIGONGIARI, Gabriele (Università di Siena e INFN Gruppo Collegato Istituto Nazionale di Fisica Nucleare (INFN)); PETRAGNANI, Giulio (Istituto Nazionale di Fisica Nucleare (INFN)); ANTONELLI, Giuseppe (Istituto Nazionale di Fisica Nucleare (INFN)); TERRENI, Giuseppe (Istituto Nazionale di Fisica Nucleare (INFN)); ORSINI, Leonardo (Istituto Nazionale di Fisica Nucleare (INFN)); MASSA, Maurizio (Istituto Nazionale di Fisica Nucleare (INFN)); MAESTRO, Paolo (Università di Siena e INFN Gruppo Collegato Istituto Nazionale di Fisica Nucleare (INFN)); CAROSI, Roberto (Istituto Nazionale di Fisica Nucleare (INFN))

Presenter: FORESI, Andrea (Università di Pisa / INFN)

Session Classification: Gas Detectors - Poster session

Track Classification: T6 - Gas Detectors