

# **Nuclear Physics at Extremely Low Energies: A Small Accelerator System under Ultra High Vacuum Conditions**

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A small accelerator system at the University of Szczecin is a part of a larger group of physical laboratories named *eLBRUS* which additionally consists of the Radiospectroscopic Laboratory using a modern NMR spectrometer and Optoelectronic Laboratory equipped with several laser systems. However, the main unit is the Laboratory for Nuclear and Medical Physics operating with two small electrostatic accelerators: the ultra-high vacuum system (20 kV voltage) and the high vacuum system (50 kV voltage). The first one is a unique system combining a high current ECR ion source with a ultra-high vacuum differential pumping system which enables to work in the target chamber at the pressure of order  $10^{-11}$  mbar. The main goal of the accelerator system is to measure nuclear reaction cross sections at extremely low energies below 20 keV which is of an astrophysical interest and important for development of new nuclear energy sources based on both fusion and fission processes. Thus, the beam current of light ions (up to Ar ions) reaches the value 1 mA at the target which cleanness is tested by the Auger Electron Spectroscopy method. The target chamber is manufactured of the mi-metal to allow detection of low energy electrons and equipped with a rest mass spectrometer. The target holder which can be heated to 1000°C or cooled down to the liquid nitrogen temperate is mounted at a 5-axis transfer system that moves the targets from a preparation chamber to the final target chamber without breaking the vacuum. The entire accelerator system should be completed in the near future with an additional deceleration/acceleration line that extends available ion energies and currents.