The ISOL method for Nuclear Physics and Medical applications

Maria J G Borge[A]

[A]Instituto de Estructura de la Materia, CSIC, Madrid, Spain

Abstract

The ISOL method involves the bombardment of a thick target with a high energy intense normally a beam, producing high yields of exotic nuclei with half-lives down to the millisecond range. By a clever combination of target and ion source units, pure beams of over 1000 different nuclei of 75 elements are being produced in the ISOLDE Facility at CERN. This facility has garnered unique expertise in radioactive beams over the fifty years since its first radioactive beams. The beams are delivered to experiments where fundamental properties of the nuclei such as masses, radii, decay modes, structure and shapes are determined. In addition, since 2001 ISOLDE offers the largest variety of post-accelerated radioactive beams in the world today from ^{6}He to ^{224}Ra at energies now reaching nearly 10 MeV/nucleon.

The application of radioisotopes in medicine was proposed shortly after the discovery of radioactivity being ^{223}Ra and ^{224}Ra, two alpha emitters, applied to skin lesions in the treatment of the Lupus disease almost a century ago. At ISOLDE the adventure started in the late seventies producing radioisotopes for medical research. This activity has been fostered in 2013 when the MEDICIS research facility was launched with the aim of investigating the therapeutic and diagnostic potential of novel isotopes. It reuses the proton beam from CERN after it has hit the ISOLDE target to produce "medical" carrier-free isotopes just before the beam dump. The facility start operation in 2018 sending the first batches to the Geneva University Hospital (HUG).

In this presentation the ISOLDE and MEDICIS facilities will be presented.