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The new pulsed neutron beam facility at CNA (Spain)

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The neutron research activities with the Tandem Pelletron Accelerator at CNA in Seville (Spain) is based on the development of neutron sources with different energy and angular distributions, which could be generated by 7Li(p,n) and D(D,n) reactions. The neutron beam characterization is done using the Time of Flight technique (TOF). The TOF technique allows measuring neutron induced cross section as a function of the neutron energy, which can be obtained from the flight time that a neutron spends to travel over known path. To implement TOF technique one needs pulsed ion beams.
In order to provide pulsed beams, CNA team and NEC staff are currently working on a chopping/bunching system installation and commissioning, as well as the addition of new equipment to better monitor and control the beam in a new neutron line. The beam chopper consists of a pair of electrically deflecting plates, mounted in parallel to the initial ion beam. One plate is normally polarized with dc voltage deflecting the beam on an absorbing beam catcher. The second one is supplied with an electronic switch. Both work together producing an oscillation of the beam in the transverse direction, thus creating a beam pulse. The bunching unit, being made up involving a pair of tubular electrodes, is mounted coaxially to the ion beam, after the pulsing unit. The electrodes are supplied with radiofrequency voltage phase locked to the different frequencies of the chopping system. The entrance and the exit gaps of the tubular bunching electrodes are used for the time compression of the beam pulse. The other new devices are: a beam profile monitor (BPM), two magnetic steerers, two manual slits, a Faraday cup, and a Pick-Up.
The chopping/bunching system has been designed to deal with a primary beam of protons or deuterium. The first tests with protons show a pulsed beam with a FWHM of the order of ns and expected frequency.
These promising results will lead the way to various research lines in Seville, among them are nuclear energy production, radiation protection, cancer therapy by neutron irradiation, radio-biological and nuclear structure research.

Selected session

Accelerators and Instrumentation

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