Département de Physique Nucléaire

Séminaires du DPhN

Vendredi 18/06/2010, 11:00

Bat 703, p 45, CEA Saclay, Orme des Merisiers

Livius Trache

Texas A & M

Decay spectroscopy for H-burning reactions in novae and XRB

The indirect methods in nuclear astrophysics using radioactive nuclear beams are unique tools to study some stellar reactions or are useful to complement the direct measurements of others. In many radiative proton capture reactions important in novae and XRBs, the resonant parts play the capital role. We use decay spectroscopy techniques to find these resonances and study their properties. We have developed techniques to measure beta- and beta-delayed proton decay of sd-shell, proton-rich nuclei produced and separated with the MARS recoil spectrometer of Texas A&M University. The short-lived radioactive species are produced in-flight, separated, then slowed down (from about 40 MeV/u) and implanted in the middle of very thin Si detectors. Implantation in very thin detectors allows us to measure protons with energies as low as 200 keV from nuclei with lifetimes of 100 ms or less. Using this technique, we have studied the decay of 23Al, 31Cl and 20Mg, all important for understanding explosive H-burning in novae. The technique has shown a remarkable selectivity to beta-delayed charged-particle emission and works even at radioactive beam rates of a few pps. The states populated are resonances for the radiative proton capture reactions 22Na(p,g)23Mg (crucial for the depletion of 22Na in novae) and 30P(p,g)31S (bottleneck in novae and XRB burning), respectively.

Contact : -