Abstract submitted for the
International Nuclear Physics Conference / 98
Paris, 24-28 August 1998

MISTRAL: A NEW ATOMIC MASS MEASUREMENT PROGRAM FOR VERY SHORT-LIVED NUCLIDES

C. Toader, G. Audi, C. Borcea, H. Doubre, M. Duma, M. Jacotin, J.-F. Képinski, G. Le Scornet, M.D. Lunney, C. Monsanglant, M. de Saint Simon and C. Thibault

Centre de Spectrométrie Nucléaire et de Spectrométrie de Masse, CSNSM, IN2P3/CNRS, F-91405 Orsay, France
and the MISTRAL collaboration

Accurate mass measurements of radioactive isotopes are solicited for two principal reasons: the elucidation of nuclear structure and the constraint of nuclear mass models for reliable extrapolation into areas of astrophysical interest.

The MISTRAL experiment (Mass measurements at ISolde using a Transmission RAdiofrequency spectrometer on Line) has had its first radioactive beam in November 1997. Stable beam and radioactive beam tests are presently been carried out to study all possible systematic effects. First measurements are planned by the mid of 1998 in the region of light nuclides around $A = 30$, of particular challenge for nuclear models. This will be followed by attempts to extend the isotopic chains of Sn and In in an effort to improve astrophysical models.

MISTRAL consists of a radiofrequency Smith-type spectrometer. The mass is obtained by the comparison of the cyclotron frequency of the unknown mass in a homogeneous magnetic field to that of a reference mass. The cyclotron frequency is measured by a kinetic energy modulation of the ion orbit inside the spectrometer using a radiofrequency voltage.

Owing to its high sensitivity MISTRAL is particularly well suited for direct measurements of very short-lived nuclides ($T_{1/2} < 1$ s). The achieved spectrometer resolution of 10^5 provides a potential measurement accuracy of $5 * 10^{-7}$ which could indicate new nuclear structure, reduce the large divergence between various model predictions, and provide accurate data for possible halo nuclei.