Contribution ID: **31** Type: **Invited**

# Testing classical concepts with the help of modern techniques at ISOLTRAP

*Thursday, 3 December 2015 13:40 (30 minutes)*

The evolution of nuclear binding energies with proton and neutron number is one of the key experimental inputs for the study of nuclear structure. It contributed significantly to the consolidation of the traditional concepts of nuclear shells and nuclear deformation, still largely present in phenomenological theoretical approaches. We will present recent ISOLTRAP measurements of binding energies of exotic nuclides in the vicinity of proton and neutron shell closures and across regions of nuclear deformation. The masses of cadmium isotopes 129-131Cd bring new information concerning the strength of the N = 82 shell closure below the magic proton number Z = 50 where 130Cd is considered a classical waiting-point nucleus for the r-process of nucleosynthesis. We will illustrate that the measured masses have a significant impact on the prediction of the abundance of r-process nuclides around mass A = 130. In addition, recent ISOLTRAP mass values of neutron-rich nuclides 101,102Sr, 100-102Rb, 97, 98Kr close to the border of the A = 100 shape-transition region will be discussed in the framework of self-consistent mean-field theory. The masses of the most exotic of these nuclides were determined using ISOLTRAP's multi-reflection time-of-flight mass spectrometer. Furthermore, this device was used as beam-detection system for a number of in-source laser-spectroscopy studies in the neutron-deficient lead region, exhibiting very interesting phenomena of shape transition and shape coexistence. Results from the most recent campaigns on mercury and gold isotopes will be presented.

**Primary author:** MANEA, Vladimir (Max-Planck-Gesellschaft (DE))

**Co-authors:** WELKER, Andree (Technische Universitaet Dresden (DE)); DE ROUBIN, Antoine (MPIK); CAKIRLI, Burcu (Department of Physics, Istanbul University); LUNNEY, David (CSNSM-IN2P3-CNRS, Orsay, France); NEIDHERR, Dennis (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE)); ATANASOV, Dinko (Max-Planck--Gesellschaft (DE)); KISLER, Dmitry (Max-Planck-Institute for Nuclear Physics, Heidelberg, Germany); MINAYA RAMIREZ, Enrique (Max-Planck-Gesellschaft (DE)); HERFURTH, Frank (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE)); WIENHOLTZ, Frank (Ernst-Moritz-Arndt-Universitaet (DE)); ZUBER, Kai (Technische Universitaet Dresden); BLAUM, Klaus (Max-Planck-Gesellschaft (DE)); Prof. SCHWEIKHARD, Lutz (Institute for Physics, Greifswald University, Germany); KOWALSKA, Magdalena (CERN); ROSENBUSCH, Marco (Ernst--Moritz-Arndt-Universitaet (DE)); BREITENFELDT, Martin (CERN); MOUGEOT, Maxime (CSNSM-IN2P3-CNRS, Orsay, France); ALTHUBITI, Numa Abdulmaeen S (University of Manchester (GB)); Dr ASCHER, Pauline (Max--Planck-Institute for Nuclear Physics, Heidelberg); WOLF, Robert (Max-Planck-Gesellschaft (DE)); GEORGE, Sebastian (Max-Planck-Institute for Nuclear Physics, Heidelberg, Germany); KREIM, Susanne (Max-Planck-Institute for Nuclear Physics, Heidelberg, Germany); COCOLIOS, Thomas Elias (University of Manchester (GB)); LITVINOV, Yuri (GSI, Darmstadt)

**Presenter:** MANEA, Vladimir (Max-Planck-Gesellschaft (DE))

**Session Classification:** Ground State Properties