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Mass measurements of neutron-rich copper isotopes and technical developments at ISOLTRAP

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We present very recent ISOLTRAP [1, 2] measurements of neutron rich copper isotopes, where –with the help of the multi-reflection time-of-flight mass spectrometer – ^{79}Cu was reached for the first time. Having only one proton above the $Z = 28$ core, the binding energies of the copper isotopes are sensitive to the evolution of nuclear shell structure close to the doubly-magic ^{78}Ni isotope. The measurements belong to an extended ISOLTRAP campaign on very neutron-rich nuclides for nuclear-structure and astrophysical cases. To reach out to even further exotic nuclides at very high precision, a position-sensitive ion detector was installed behind the precision Penning trap. It will allow the application of the Phase-Imaging Ion-Cyclotron-Resonance (PI-ICR) [3] method, which was developed at SHIPTRAP/GSI. This new technique offers higher precision in less measurement time as well as a much higher resolving power, and thus ability to resolve low-lying isomers, compared to the present Time-of-Flight Ion-Cyclotron-Resonance technique [4]. The current status and an outlook on the implementation of the PI-ICR technique at ISOLTRAP will be presented.

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References:

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Author: WELKER, Andree (Technische Universitaet Dresden (DE))

Co-authors: LUNNEY, David (CSNSM Centre de Spectrometrie Nucle aire et de Spectrometrie de); NEID-HERR, Dennis (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE)); ATANASOV, Dinko (Max-Planck-Gesellschaft (DE)); HERFURTH, Frank (GSI Darmstadt); WIENHOLTZ, Frank (Ernst-Moritz-Arndt-Universitaet (DE)); ZUBER, Kai (Technische Universitaet Dresden); BLAUM, Klaus (Max-Planck-Gesellschaft (DE)); SCHWEIKHARD, Lutz Christian (Ernst-Moritz-Arndt-Universitaet (DE)); ROSENBUSCH, Marco (Ernst-Moritz-Arndt-Universitaet (DE)); GONCHAROV, Mikhail (Max-Planck-Institute for Nuclear Physics); ALTHUBITI, Numa Abdulmaeen S (University of Manchester (GB)); WOLF, Robert (Max-Planck-Gesellschaft (DE)); KREIM, Susanne (CERN); COCULIOS, Thomas Elias (University of Manchester (GB)); MANEA, Vladimir (Max-Planck-Gesellschaft (DE))

Presenter: WELKER, Andree (Technische Universitaet Dresden (DE))

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