Contribution ID: **14** Type: **Oral presentation**

Mass measurements in the vicinity of ^{78}Ni at JYFLTRAP

Wednesday, 23 May 2018 09:20 (20 minutes)

The double Penning-trap mass spectrometer JYFLTRAP [1] at IGISOL [2] has been recently used to measure the masses of neutron-rich Fe, Co, Ni, Cu, and Zn isotopes. The masses of these nuclei close to the Z=28 and N=50 closed shells are relevant for understanding the nuclear structure far from stability but also for the studies of core-collapse supernovae. Electron captures play a key role during the collapse stage of supernovae [3] as they reduce the electron gas pressure, cool the core via neutrino emission and drive matter to more neutron-rich nuclei. To calculate the composition of matter in a core-collapse supernova, extended Nuclear Statistical Equilibrium (NSE) models can be used. One of the key parameters for the NSE calculations is the nuclear binding energy [4]. According to recent studies, the binding energies and electron capture rates on nuclei situated in the vicinity of the N=50 shell closure have a high impact on core-collapse simulations [5]. Data for the isotopes located close to Z=28 and N=50 are also important for understanding the nuclear structure close to ^{78}Ni [6].

The ions of interest were produced by 35 MeV proton-induced fission on a uranium target at IGISOL. Over the 11 nuclides measured during the one week of experiment, five were measured for the first time. The measurements were mainly done using the time-of-flight ion-cyclotron resonance technique (TOF-ICR) [7]. In addition, the novel PI-ICR technique [8] was used for some cases to identify long-living isomeric states. In this contribution, I will describe the experimental method and preliminary results from the experiment.

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Session Classification: Session 5