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DISCOVERY OF THE NEW ISOTOPES ^{169}Au, ^{170}Hg AND ^{165}Pt AND A NEW ISOMER OF ^{165}Ir USING THE MARA MASS SEPARATOR IN ITS FIRST TRAILBLAZING EXPERIMENT

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Measurements of proton decay from nuclei near or beyond the proton dripline have been widely used in recent works to shed light on otherwise inaccessible nuclear structure information, such as mother and daughter state spin assignments. There is a high sensitivity relationship between the proton decay energy (Q_P) and the partial proton decay half-life, and measurements of these quantities in potentially observable candidates can be used to determine spectroscopic factors, which allow testing of theoretical models. As such, many exotic proton emitters need to be measured. Using the new vacuum mode mass separator MARA in its maiden experiment, a 378MeV ^{78}Kr beam was incident on ^{92}Mo and ^{96}Ru targets. This produced compound nuclei ^{170}Pt*and* ^{174}*Hg* and MARA was tuned to collect mass 165 and 169 (as well as neighbours) respectively. Using the BB17 DSSD as part of the MARA-FP system, recoil decay tagging and a new novel trace readout analysis technique were used to identify fusion evaporated recoils and subsequent decays. Proton emission was observed from the new isotope ^{169}Au and from the ground state of ^{165}Ir, as well as alpha emission from the new isotopes ^{165}Pt and ^{170}Hg. Decay particle energies and half-lives were measured, and spectroscopic factor and hindrance factor calculations allowed assignment of spin among other interesting quantities.

Author: HILTON, Joshua (University of Jyväskylä)

Presenter: HILTON, Joshua (University of Jyväskylä)

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