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Penning trap mass measurement of ^{56}Cu and the redirection of the rp-process flow

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The doubly-magic nucleus ^{56}Ni is one of the most important rp-process waiting points. While we now know that it is not the endpoint of the rp-process, the flow around this nucleus is not well understood. The mass of ^{56}Cu is critical for constraining the reaction rates of the ^{55}Ni(p,γ)^{56}Cu(p,γ)^{57}Zn(β^+)^{57}Cu bypass around the ^{56}Ni waiting point, but has not been experimentally determined; calculated mass excess values have disagreed by several hundred keV. A mass measurement was undertaken using the LEBIT 9.4T Penning trap mass spectrometer at the National Superconducting Cyclotron Laboratory to rectify this situation.

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