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Sommario/riassunto	This thesis reports results of precision mass spectrometry of exotic nuclides as a means of elucidating their structure. The work was performed with the ISOLTRAP spectrometer at CERN’s ISOLDE facility. The author furthermore offers an overview of existing techniques used in Penning-trap mass spectrometry and also reports on recent promising developments regarding ISOLTRAP. This eloquently written treatment covers both theory and experiment, and includes a general phenomenological introduction to the nuclear-structure intuition contained in the trends of nuclear binding energies.