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Comparison of Resonant Ionization of Yb in high- and low-voltage mass separators

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Resonant Ionization Spectroscopy is a very efficient method for generating element-pure ion beams. The development of the necessary ionization schemes for use in online ion sources with acceleration voltages between 30 and 60 kV is usually done at more compact and inexpensive offline mass spectrometers with much lower acceleration voltages. This is possible because this difference generally does not affect the resonant excitation. In contrast, measurements on Ytterbium show differing excitation strengths in ion sources with high and low acceleration voltages if a multi-step scheme involving a Rydberg state as highest excitation is used. The transition into the ionization continuum is then possible by non-resonant absorption, collisions between atoms, or by electric fields that perturb the coulomb potential. Since the different excitations strengths still occur while using the same atomization crucibles with the same temperatures and laser powers, they have to originate from the different field strengths.

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