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Collinear laser spectroscopy at ISOLDE and recent results.

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Thirty years of collinear laser spectroscopy at ISOLDE have yielded a large number of nuclear spins, magnetic moments, electric quadrupole moments and mean square charge radii. The experiments were not just collecting nuclear data, but continuously improving the method by combining it with different detection techniques. Thus the measurements became increasingly sensitive and accurate, coping with very low yields of short-lived nuclei. This gave access to particularly interesting regions of nuclei far from stability.
Several experiments carried out over the past years, could be completed in 2010. Isotope shift measurements in magnesium yield the charge radii over the complete neutron sd-shell, from 21Mg to 32Mg which is situated well in the centre of the "island of inversion". Most sensitive measurements were performed using optical polarization and beta-asymmetry detection of which previous outstanding results include the unexpected spins and magnetic moments of 31Mg and 33Mg.
Using absolute wavelength measurement and simultaneously taking spectra with collinear and anti-collinear laser beams it was possible to overcome the accuracy limitation for very light elements arising from the huge Doppler shifts and to measure charge radii of the beryllium isotopes. The measurements, performed on 7-11Be in 2008, were now completed with a very sensitive measurement on 12Be using ion-photon coincidence for background reduction.
With the installation of ISCOOL, it had become possible to extract the beams in short bunches, thus allowing the background of fluorescence detection from scattered laser light to be reduced substantially. This was exploited for high resolution measurements on neutron-rich copper isotopes up to 75Cu, and recently on neutron-deficient isotopes down to 58Cu.

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