Coulomb excitation of the N=50 Nucleus ^{80}Zn

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The N=50 nucleus ^{78}Ni has since long been a nucleus with a lot of nuclear structure and astrophysical interest. Since this nucleus is located at the Z=28 and N=50 shell closures it forms, together with the nuclei in its neighborhood, excellent candidates to probe the strength of these shell closures far of the line of stability. At the RIB facility REX-ISOLDE (CERN) a program of low energy Coulomb excitation was started in 2002, aiming at the measurement of B(E2) values in neutron rich Zn isotopes up to the N=50 line.

These experiments have now resulted in B(E2) values to the first excited 2^+ states in ^{74,76,78,80}Zn, thereby fixing the 2^+ states in ^{78,80}Zn. Furthermore, the measurements have provided additional information (such as B(E2,$4_1^+ \rightarrow 2_1^+$) values in ^{74,76}Zn) on the onset of collectivity in these exotic isotopes. It will be shown that further experiments, such as lifetime measurements can be complementary to further explore the deformation of the 2_1^+ state.

An overview will be given on the developments of the target-ion source combination that made these experiments possible. The systematics along the N=50 closed neutron shell and the Z=30 line will be discussed and the experimental results will be compared to large scale shell model calculations (SMC). It is shown that SMC around an inert ^{56}Ni core can account for the observed systematics, but hint to a strong proton core polarization. The current results indicate that the N=50 shell closure persists down to Z=30.