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Lifetime measurements on neutron-rich isotopes

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In the region right below the neutron-rich Ni isotopes, there is an increase of collectivity produced mainly by the monopole part of the tensor interaction of the nuclear force: the interaction between f{7/2} protons and both f{5/2} neutrons (attractive) and g{9/2} neutrons (repulsive) weakens when the proton f{7/2} orbital is not fully filled, and therefore the gap between the neutron orbitals f{5/2} and the g{9/2} decreases. This mechanism will favor particle-hole excitations across N=40 subshell closure and therefore the g{9/2} orbital will play an important role in driving the nucleus towards deformation. An increase in collectivity in neutron-rich Cr isotopes towards N=40 is expected while observing the decrease in excitation energies of the first 2+ states as we increase the neutron number above the subshell closure at N=32. The cromium isotopes from N=28 up to N=38 undergo a shape transition from spherical (N=28, {52}Cr) to deformed in {60,62}Cr, with a 4{+}/2{+} typical of a γ-soft rotor. This kind of transition has been described within the framework of IBM and the critical-point where the phase transition is described by the E(5) symmetry (from spherical vibrator U(5) to a γ-soft rotor O(6)). The expected behaviour in the excitation energies (energy spectrum) of the E(5) symmetry was observed in the N=34 Cr isotope ({58}Cr). The shape evolution along the Cr isotopic chain will be studied in terms of measured B(E2) relative values of electromagnetic transitions in 58Cr and 60Cr. To this purpose, the nuclei of interest were populated as products of a multinucleon-transfer reaction with a 64Ni beam at an energy of 460 MeV, directed onto a {238}U target. Lifetimes of first excited states of 58,60Cr will be measured by using the Recoil Distance Doppler Shift method (RDDS) with the AGATA Demostrator-PRISMA setup. Preliminary results will be presented.

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