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First combined DSAM and Coulomb excitation experiment at REX-ISOLDE - measuring the sign of the spectroscopic quadrupole moment of the 2+1 state in neutron-rich 140Ba

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The importance of precise lifetime information has recently been demonstrated in experiments at REX-ISOLDE and MINIBALL using the sensitivity of the Coulex yields to the nuclear reorientation effect in order to determine the sign of the spectroscopic quadrupole moment of the 2+1 state in 70Se [1,2]. Therefore we have utilized a new combined technique of lifetime measurement using the Doppler-Shift-Attenuation-Method (DSAM) and analysis of Coulex yields for the measurement of the spectroscopic quadrupole moment of the 2+1 state in unstable neutron-rich 140Ba. On the basis of the new lifetime of tau = =12.5(6)ps it was possible to fix the sign of the spectroscopic quadrupole moment to be negative - equivalent to an oblate deformation. Furthermore the experiment was used to test the feasibility of ''Recoil-in-vacuum" studies at REX-ISOLDE and MINIBALL for the measurement of magnetic dipole moments, as recently described in [3,4]. An upper limit for the absolute value of the g(2+1)-factor in 140Ba could be obtained.

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