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Transfer reactions with T-REX

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The "Island of inversion" is a region in the nuclear chart around the neutron rich N=20 isotopes of Ne, Na and Mg, where intruder fp-orbitals favoring deformed shapes compete with the normal spherical sd configurations.

Transfer reactions yield important spectroscopic information, i.e. spin and parity assignments as well as spectroscopic factors, complementary to the information obtained in Coulomb excitation. Since the transfered nucleon can occupy excited states, the properties of these states can be studied as well. In order to study transfer reactions in inverse kinematics at REX-ISOLDE with MINIBALL a new setup T-REX was built covering a large solid angle for the detection of light charged particles. In the first experiment the nucleus 31Mg which is right on the edge of the "Island of inversion" was studied via the d(30Mg, 31Mg)p reaction.

An alternative view on the change in structure when crossing the border of the island can be obtained from the study of excited 0+ states. The nearly spherical ground state of 30Mg has as analogue an excited spherical 0+ state in 32Mg whose ground state is deformed. The coexisting excited 0+ state in 32Mg has not been observed so far. Theoretical predictions for the excitation energy of this state range from 1.5 to 3 MeV. We populated states in 32Mg by a (t,p) two-neutron transfer reaction in inverse kinematics with a 30Mg beam at 1.83 MeV/u from REX-ISOLDE impinging on a tritium-loaded Ti target which has been used at REX-ISOLDE for the first time.

Results from these experiments as well as future plans for transfer reactions at REX-ISOLDE will be presented.

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