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Transfer reactions into the Island of Inversion

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The T-REX setup was built to use the post-accelerated radioactive beams from REX-ISOLDE to study isotopes far from stability using transfer reactions in inverse kinematics.

The first experiments performed with T-REX aimed at a better understanding of the "Island of Inversion", a region in the nuclear chart near ^{32}Mg where the narrowing of the $N = 20$ gap and pairing correlations can lead to deformed ground states with $2p - 2h$ configurations.

We will present results from d(^{30}Mg,p)^{31}Mg, determining for the first time the negative parity of the second excited state at 221 keV.
The experiment also showed a cross section for this second excited state that is a factor four lower than the cross sections of the ground state and the first excited state when compared to DWBA calculations.
This might be an indication of a possible shape co-existence of an oblate deformed second excited state and prolate deformed ground and first excited state.

The second experiment performed with T-REX in the Island of Inversion was the t(^{30}Mg,p)^{32}Mg experiment which identified the proposed shape coexisting excited 0^+ state to be at 1058 keV.
This is much lower than any prediction by theoretical models.

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