

Unveiling the intruder deformed 0+2 state in ^{34}Si

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The 0+2 state in ^{34}Si has been populated at the Ganil/Lise3 facility through the β^- -decay of a newly discovered 1+ isomer in ^{34}Al of 26(1) ms half-life. The simultaneous detection of e^+e^- pairs allowed the determination of the excitation energy $E(0+2)=2719(3)$ keV and the half-life $T_{1/2}=19.4(7)$ ns, from which an electric monopole strength of $\rho^2(E0)=13.0(0.9)\cdot 10^{-3}$ was deduced. The 2+1 state is observed to decay both to the 0+1 ground state and to the newly observed 0+2 state (via a 607(2) keV transition) with a ratio of 1380(717). Gathering all information, a weak mixing with the 0+1 and a large deformation parameter of $\beta=0.29(4)$ are found for the 0+2 state, in good agreement with shell model calculations using a new sd_{pf} -u-mix interaction allowing np-nh excitations across the $N = 20$ shell gap.

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