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## First spectroscopy of <sup>62</sup>Ti: Shell evolution towards <sup>60</sup>Ca

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Shell evolution for the N=40 isotones has recently attracted considerable attention. In a single-particle shell model N=40, which corresponds to the filling of the fp neutron shells, is predicted to be a sub-shell closure. However, measurements of the first 2<sup>+</sup> states in <sup>64</sup>Cr and <sup>66</sup>Fe give evidence of a rapid weakening of the N=40 gap when removing protons from the  $f_{7/2}$  shell. Conversely, the 2<sup>+</sup> energies of <sup>58,60</sup>Ti show only a slight decrease towards N = 40. To further understand the shell evolution towards the supposedly doubly-magic <sup>60</sup>Ca, we report on the measurement of the first excited 2<sup>+</sup> state of <sup>62</sup>Ti.

Excited states in <sup>62</sup>Ti were populated via the <sup>63</sup>V(p,p2)<sup>62</sup>Ti reaction and studied using  $\gamma$ -ray spectroscopy. The energies of the  $2^+ \rightarrow 0^+$  and  $4^+ \rightarrow 2^+$  transitions, observed here for the first time, indicate a deformed <sup>62</sup>Ti ground state. These energies are increased compared to the neighboring Cr and Fe isotones, suggesting a small decrease of quadrupole collectivity. This result is well reproduced by large-scale shell-model calculations based on effective interactions, while ab initio and beyond mean-field calculations do not yet reproduce them. The shell-model calculations for <sup>62</sup>Ti show a dominant configuration with four neutrons excited across the N=40 gap. Likewise, they indicate that the island of inversion extends down to Z=20, disfavoring a possible doubly magic character of <sup>60</sup>Ca.

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