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The decay of $T_z=-1$ fp shell nuclei

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The decay of $T_z=-1$ fp shell nuclei
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In this talk, I plan to present an overview of recent studies on the β^+ decay of $T_z=-1$ nuclei in the fp-shell. The overview includes campaigns conducted at GSI, GANIL, and RIKEN. These experiments were carried out at fragmentation facilities using high-intensity primary beams, high-performance recoil separators, and advanced detector techniques. The experimental setup features charged particle detectors and gamma-ray Germanium (Ge) arrays. All the decays are very fast due to the involvement of super-allowed Fermi (F) transitions and allowed Gamow-Teller (GT) transitions. The experiments yielded rich spectroscopic data, enabling comparisons along the near- $N=Z$ line. Several interesting phenomena can be studied, such as:

1. Mirror symmetry effects: These are explored by comparing β^+ decays with the mirror charge-exchange reactions on stable $T_z=+1$ nuclei targets. (Y. Fujita, B. Rubio, W. Gelletly, *Progr. Part. Nucl. Phys.* 2011, 66, 549–606)
2. SU(4) symmetry interpretation: Possible insights into the decays based on SU(4) symmetry. (Van Isacker et al. *Symmetry* 2023, 15(11), 2001)
3. Theoretical calculations: Including these Fermi transitions in theoretical calculations for super-allowed f_t -values and their implications for V_{ud} matrix element and CKM matrix unitarity. (I. S. Towner and J. C. Hardy, *Phys. Rev C* 92, 055505 (2015))

Overview of the $T_z=-1$ beta decaying cases discussed in this work, references below

1. $^{42}\text{Ti}-^{54}\text{Ni}$ (GSI) Molina et al. *Phys. Rev. C* 91, 014301 (2015)
2. ^{56}Zn (GANIL and RIKEN) Kuckuc et al *Eur. Phys. J. A* 2017, 53, 134-1–10 DOI 10.1140/epja/i2017-12327-1 Nishimura et al. in preparation
3. ^{60}Ge (RIKEN) Orrigo et al. *Phys. Rev. C* 2021, 103, 014324-1–12.
4. ^{64}Se (RIKEN) Aguilera et al. in preparation
5. ^{70}Kr (RIKEN) Vitéz-Sveicz et al. *Phys. Lett. B* 2022, 830, 137123-1–8.

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