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Proton emission from 54mNi and mirror symmetry (breaking) with 54mFe

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An experiment on 4D-imaging of drip-line radioactivity near doubly-magic 56Ni was conducted at GANIL. Pictured with the ACTAR TPC, proton-emission branches from the 6457-keV, 10+ isomer in 54mNi were established 1. These feature unusually high angular momentum, l=5 and l=7, respectively, which requires a dedicated theoretical treatment 2.

The completed proton-emission pattern of 54mNi also allows for refined studies of isospin-symmetry breaking by looking at its previously measured E2 and E4 gamma-decay paths [3]. By means of a comparison with their well-known 'mirror transitions' in 54mFe, and aided by a variety of shell-model calculations in the fp model space, effective charges for E4 transitions near N=Z 56Ni could be estimated. Mirror-energy differences were explored with various shell-model interactions and isospin-symmetry breaking terms [4].

1 J. Giovinazzo, T. Roger, B. Blank, D. Rudolph, B.A. Brown, et al., Nature Commun. 12, 4805 (2021).
2 B.A. Brown, priv. comm.
[3] D. Rudolph, R. Hoischen, M. Hellström, et al., Phys. Rev. C 78, 021301(R) (2008).
[4] D. Rudolph, B. Blank, J. Giovinazzo, T. Roger, et al., submitted to Phys. Lett. B.

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