Systematic study of excited $0^+$ states in the Er isotopes populated in the $(p,t)$ reaction

P.E. GARRETT, A. FINLAY, D. KISLIUK, S. CHAGNON-LESSARD, A. DIAZ VARELA, R. DUNLOP, D.S. JAMIESON, K.G. LEACH, C.E. SVENSSON, University of Guelph, G.C. BALL, S. TRIAMBAK, Triumf, T. FAESTERMANN, Technische Universität München, R. HERTENBERGER, H.-F. WIRTH, Ludwig Maximilian Universität München — The nature of excited $0^+$ states in well-deformed nuclei continue to pose a challenge in nuclear structure. Often, even the nature of the first excited $0^+$ state, $0^+_2$, is unclear and interpretations involving $\beta$ vibrations, pairing excitations, two-phonon $\gamma$ vibrations, etc., have been advanced with different degrees of success. A major issue historically has been lack of data on excited $0^+$ states. In light of this, the study of the Er isotopes has been extended via the $^{162}$Er and $^{164}$Er $(p,t)$ reactions. The experiments were performed at the Maier-Leibnitz Laboratory using 22 MeV proton beams on highly-enriched targets of $^{162,164}$Er, and the reaction products were analyzed with the Q3D spectrograph. Strong populations of the $0^+_2$ states have been observed. The systematics of the strong population of the $0^+$ states in the Er$(p,t)$ reactions sheds light on the underlying nature of these levels.

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