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Determination of Q_{EC} values of $T = 1/2$ mirror nuclei at LEBIT
MARTIN EIBACH, National Superconducting Cyclotron Laboratory, GEORG BOLLEN, Facility for Rare Isotope Beams, MAXIME BRODEUR, University of Notre Dame, KORTNEY COOPER, KERIM GULYUZ, CHRIS IZZO, DAVID MORRISSEY, National Superconducting Cyclotron Laboratory, MATTHEW REDSHAW, Central Michigan University, RYAN RINGLE, RACHEL SANDLER, STEFAN SCHWARZ, CHANDANA SUMITHRARACHCHI, ADRIAN VALVERDE, National Superconducting Cyclotron Laboratory, ANTONIO VILLARI, Facility for Rare Isotope Beams — The ongoing search for evidence of physics beyond the standard model is one of the driving forces in fundamental physics research. Particularly crucial for testing the validity of the electroweak model is the unitarity of the Cabibbo-Kobayashi-Maskawa matrix. The most stringent test is the verification of the first row condition $V_{ud}^2 + V_{us}^2 + V_{ub}^2 = 1$. Therefore, the dominating element, V_{ud}, has to be determined with high precision. Complementary methods are measurements of the free neutron lifetime, pion decay rates, superallowed decay properties of $T = 1$ nuclei and the newer approach of decay property measurements of $T = 1/2$ isospin doublets. In the latter two approaches V_{ud} is determined via $\mathcal{F}$t values to which the transition energy Q_{EC} contributes in the fifth power. We report the first high-precision measurement of Q_{EC} of the mixed Fermi-Gamow-Teller decays of the three T=1/2 nuclei ^{11}C, ^{21}Na and ^{29}P. The uncertainties of all values were reduced significantly and their contribution to V_{ud} thereby reduced the same order as the theoretical uncertainties.

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