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High-resolution 50Cr(p,t)48Cr coincidence measurements using the K600 and CAKE setup at iThemba LABS

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The observation of γ-ray decays from the radioactive isotope ^{44}Ti makes it one of the significant isotopes in the diagnosis of core-collapse supernovae (CCSNe) explosions. The abundance of 44Ti from CCSNe explosions has been shown to be strongly dependent on the ^{44}Ti$(\alpha, p)^{47}$V reaction rate, which destroys ^{44}Ti. Direct measurements of the ^{44}Ti(α, p) 47V reaction within the Gamow window ($E_{c.m.}$ = 2 - 6 MeV) have been challenging due to the low cross sections and insufficient radioactive ion beam intensities. As a result, the reaction rate is still based on statistical models, which may not be reliable for α-induced reactions on N=Z nuclei due to the lower effective level density in the compound nucleus. To get the necessary experimental constraints of the ^{44}Ti$(\alpha, p)^{47}$V reaction such as the level density and branching ratios of the compound nucleus, ^{48}Cr, a high-resolution 0° ^{50}Cr$(p, t)^{48}$Cr coincidence measurement was performed using the K600 magnetic spectrometer and an array of five double-sided silicon detectors called CAKE. Preliminary results from the coincidence measurements will be presented.

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