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Study of the charged particle decays from 48Cr using CAKE

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The observation of γ-ray decays from the radioative isotope ^{44}Ti makes it one of the significant isotopes in the diagnosis of core-collapse supernovae (CCSNe) explosions [1]. The abundance of ^{44}Ti from CCSNe explosions has been shown to be strongly dependent on the ^{44}Ti$(\alpha, p)^{47}$V reaction rate, which destroys ^{44}Ti [2]. Direct measurements of the ^{44}Ti$(\alpha, p)^{47}$V reaction within the Gamow window ($E_{\mathrm{c.m.}}$ = 2 - 6 MeV) have been challenging due to the low cross sections and insufficient radioactive ion beam intensities [3,4]. 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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Author: BINDA, Sifundo (University of the Witwatersrand and iThemba LABS)

Co-authors: ADSLEY, Philip (Texas A&M University); PELLEGRI, Luna (University of the Witwatersrand and iThemba LABS); DONALDSON, Lindsay (iThemba LABS); LONG, Alex (LANL); -GOERRES, -Joachim (University of Notre Dame); MARIN-LAMBARRI, Daniel (University of the Western Cape); SIDERAS-HADDAD, Elias (University of the Witwatersrand); SMIT, Frederick (iThemba LABS); BERG, Georg (University of Notre Dame); BRUMMER, Johann Wiggert (iThemba LABS); LI, Kevin Ching Wei (University of Oslo); MALATJI, Kgashane (iThemba LABS); POOL, L.C. (iThemba LABS); KOHNE, M (Stellenbosch University); COUDER, Manoel (University of Notre Dame); WIEDEKING, Mathis (iThemba Labs/University of the Witwatersrand); WIESCHER, Michael (University of Notre Dame); KAMIL, Mohammed (University of the Western Cape); KHUMALO, Nontobeko (University of the Western Cape); PAPKA, Paul (Stellenbosch University); NEVELING, Retief (iThemba LABS); MTHEMBU, Sinegugu (University of the Western Cape); MHLONGO, Sizwe (iThemba LABS); PESUDO, Vicente (University of the Western Cape); MEISEL, Zach (University of Notre Dame); Dr VAN ZYL, Johannes Jacobus (Stellenbosch University (ZA))

Presenter: BINDA, Sifundo (University of the Witwatersrand and iThemba LABS)