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Pionic Fusion of ^{4}He + ^{12}C ANDREW ZARRELLA, Texas AM Univ, SHERRY YENNELLO, Texas AM University Cyclotron Institute — Pionic fusion is the process by which two nuclei fuse and then deexcite by the exclusive emission of a pion. These reactions represent the most extreme examples of deep subthreshold pion production and provide evidence for an unknown, collective mechanism for pion production. An experiment was performed at the Texas A&M University Cyclotron Institute to measure the cross section of the ^{4}He + ^{12}C $\rightarrow$ ^{16}N + π^{+} reaction. The Momentum Achromat Recoil Spectrometer (MARS) was used to separate and identify the ^{16}N fusion residues and the newly constructed Partial Truncated Icosahedron (ParTI) phoswich array was used to identify charged pions. The detector responses for each phoswich unit were recorded using fast-sampling ADCs which allow all light charged particles in the ParTI phoswiches to be identified using "fast vs. slow" pulse shape discrimination. By writing the waveform responses, pions can also be identified by the presence of a characteristic muon decay pulse. The combination of the residue-pion coincidence and the two independent pion identification techniques represent a highly sensitive experimental design for studying pionic fusion reactions.

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