The Study of Halo States in $^{10}$Be and $^{11}$Be

K. KUHN, F. SARAZIN, Colorado School of Mines, (PCB)$^2$ COLLABORATION, TIGRESS COLLABORATION — One-neutron transfer reactions are being used to study single-particle neutron states in nuclei. For one-neutron halo nuclei, such as $^{11}$Be, the (p,d) reaction enables the removal of the halo neutron or of one of the core neutrons. This way, it is possible to simultaneously study the halo wavefunction of the $^{11}$Be ground-state but also a possible excited halo state in $^{10}$Be. The $^{11}$Be(p, d)$^{10}$Be transfer reaction at 10 MeV/nucleon is being investigated at the TRIUMF-ISAC II facility with the Printed Circuit Board Based Charged Particle ((PCB)$^2$) array inside the TRIUMF ISAC Gamma-Ray Escape-Suppressed Spectrometer (TIGRESS). The ground state and first excited state of $^{10}$Be can be directly identified using deuteron identification and kinematics from the charged particle array. To differentiate between the four excited states in$^{10}$Be around 6 MeV, including the suspected halo state (2$^-$ state), the gamma rays from TIGRESS are used in coincidence with the identified deuterons. Analysis is still in progress and the preliminary angular distributions for the $^{10}$Be ground state and first excited will be shown along with gamma ray data used in coincidence with the deuterons.

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