# Development and performance of a position-sensitive proportional avalanche counter tracking system

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Most of our current understanding in nuclear physics has come from using stable targets and beams. Stable nuclei represent only a small fraction of the total nuclei that can exist, but do not exhibit many of the exotic proprieties seen in nuclei far from stability, such as halos [1]. The ability to study unstable nuclei has opened up a vast new range of physics to be explored. The decay of these isotopes makes most of them unsuitable as targets, but even short lived isotopes can be used as beams, known as radioactive (or rare) isotope beams (RIBs) [2]. The reactions dynamics group at the Australian National University (ANU) have been working on achieving an Australian RIB capability [3]. Secondary beams (e.g $^{6}$He, $^{8}$Li, $^{10}$Be, $^{12}$B) will be produced by high cross section transfer reactions [4].

The 6.5 T superconducting solenoidal RIB separator SOLEROO (solenoidal exotic rare isotope separator), recently developed at the ANU [3] can achieve RIB reasonable purities, but not more than 60% [4]. This single solenoid separator does not have the separating power of the TwinSol and RIBRAS two-solenoid facilities [5, 6]. To compensate for this the SOLEROO separator uses a pair of position sensitive proportional avalanche counters (PPACs) as tracking detectors operated with $C_3H_8$ gas [7]. These tracking detectors will electronically tag each secondary beam ion passing through the tracking detectors, before hitting the secondary target, allowing reconstruction of ion trajectories and the electronic removal of contaminant species. This will allow the practical use of RIBs with physical purities as low as 10%. Combined with an large solid angle 512 pixel Si detector system, the system will permit the measurement of cross sections of interest in both nuclear reaction dynamics and astrophysics. This poster will present the progress in developing the pair of twin PPAC tracking detectors and the capability to identify the secondary RIBs of interest.

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