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Nuclear physics with TriSol at Notre Dame's Nuclear Science Laboratory

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The detailed study of radioactive nuclei has resulted in opportunities for addressing many open questions in nuclear structure and nuclear astrophysics. For over three decades, the TwinSol separator at the University of Notre Dame has produced high-quality in-flight radioactive beams at low-energy for light isotopes that have been used in experiments aimed at nuclear structure, astrophysics, and fundamental symmetries studies. We have recently upgraded the TwinSol separator by adding additional elements: a dipole magnet, and a third solenoid. This new TriSol separator will improve the quality and purity of future radioactive beams. This improvement will enable the use of heavier beams and address beam contamination that has hindered past experiments. The current status of TriSol and its science program will be presented along with the role the TriSol program plays in the current landscape of nuclear physics user facilities. The TriSol program includes plans for the study of ^{11}C$(p,p)^{11}$C reactions for investigating the nature of the first stars, ^{14}O$(\alpha,p)^{17}$F and its influence on reaction networks in x-ray bursts, the measurement of fusion reactions on Ne isotopes, and precision half-life measurements for fundamental symmetries studies.

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