Accelerator Mass Spectrometry for Nuclear Astrophysics at Notre Dame

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Evolving from detection methods and techniques developed in nuclear physics, Accelerator Mass Spectrometry makes it possible to unambiguously identify the A and Z of a specific ion. This identification enables the separation of rare ions of interest from an isobaric background many orders of magnitude higher. This technique has lead to many applications ranging from environmental science and research in paleoclimates to nuclear astrophysics and meteor research.

The talk will concentrate on the use of the gas-filled magnet technique used in conjunction with Accelerator Mass Spectrometry (AMS) to measure radionuclide concentrations and reaction cross-sections of importance in stellar nuclearsynthesis and galactic radioactivities. Such a system (MANTIS; Magnet for Astrophysical Nucleosynthesis studies Through Isobar Separation) was set-up at the Nuclear Structure Laboratory (NSL) at the University of Notre Dame together with graduate and undergraduate students and is used as an AMS system for the measurement of radioisotopes like ^{60}Fe and ^{93}Zr, as well as production cross sections such as ^{40}Ca(α,γ)^{44}Ti and ^{33}S(α, p)^{36}Cl. A number of future projects as well as some geared towards applied methods will also be presented.