

The Combined Ion and Neutron Spectrometer (CINS)

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A novel instrument is being constructed that contains both charged particle and neutron detectors in a single package with a common readout. The prototype instrument is being developed under a grant from the National Space Biomedical Research Institute, and will be extensively tested in an accelerator environment. We expect this will lead to a second-generation instrument suitable for use in flight. The charged particle subsystem consists of a mixed stack of silicon detectors and plastic scintillators, with a thick BGO crystal at one end. The silicon part of the stack is similar to that in MARIE, augmented by the plastic scintillators to enable a high-rate data-taking mode, and by the BGO to measure the total energy of protons up to about 150 MeV. Several problems discovered with the MARIE system can be avoided in CINS by using a more robust data acquisition system. The APL group has a proven existing system that will be incorporated in CINS. The same system is being used for the neutron spectrometer system aboard the Messenger spacecraft, which is now in flight to a rendezvous with Mercury in 2008. The neutron detector system consists of three separate counters: for high energies, a thick (5mm) silicon detector surrounded by an anti-coincidence shield; for medium energies, a boron-loaded scintillator manufactured by Eljen Technology; and for low energies, a ³He tube. The neutron energy spectrometer has been under development since 1997, with versions being flown on aircraft and balloon flights. Considerable work has been done to model the response of the CINS system using GEANT4. We will present those results along with the roadmap for development of the instrument..