

International Summit on Current Trends in Mass Spectrometry

July 13-15, 2015 New Orleans, USA

Latest developments in accelerator mass spectrometry

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The technical evolution of Accelerator Mass Spectrometry (AMS) instrumentation over the last ten years is summarized. A key characteristic of AMS is destruction of molecular interferences and subsequent analyses of atomic ions. It makes the extreme abundance sensitivity possible (in specific cases, below isotopic ratios of 10^{-16}). This can be reached with instruments having quite modes mass resolving power ($M/\Delta M$ less than 300). Today, 1+ charge state is used, molecular interferences are destroyed in multiple collisions with stripper gas atoms or molecules, and a high yield atomic ion is reached at energies of a few hundred keV. Thus, AMS instruments develop towards lab size or tabletop devices. The use of He as stripper gas has further improved performance with respect to overall detection efficiency and reproducibility of measurement conditions. In parallel, implementation of permanent magnets into dedicated radiocarbon AMS system is progressed. This reduces complexity of the instruments and significantly reduces operation and installation costs. For radiocarbon, He stripping has potential to further down size instruments and reduce the ion energy below 50 keV. I will summarize the latest achievements. But, low energy AMS is not limited to radiocarbon only and there is a great potential for ^{10}Be , ^{26}Al , ^{129}I and actinides measurements at compact AMS systems. These developments have launched the wide spread use of AMS in various research fields and has resulted in a boom of new AMS facilities. The related impact to the wide variety of applications of AMS in modern research is not covered.

Biography

Hans-Arno Synal graduated in Physics at the University of Bonn (Germany). In 1986, he moved to ETH Zurich (Switzerland) for his PhD studies. As research scientist, at the Paul Scherrer Institute (Switzerland), he became group leader and was responsible for the accelerator facilities at the Ion Beam Physics Laboratory. In 2008, he was appointed as Head of the ETH Laboratory of Ion Beam Physics and since 2011 he is the honorary Professor at ETH Zurich. He has published more than 230 papers in reputed journals.

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