The status of the new AMS device for medium mass isotopes at the Cologne University

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A new device has been set up at the Cologne 10 MV FN accelerator to perform medium mass AMS measurements, e. g. ^{53}Mn and ^{60}Fe. It consists of an achromatic injector with an MC-SNICS ion source (electrostatic analyzer and magnet radius of 0.435 m) with a fast injection system for the switching between the stable and rare ion beam. With the accelerator ion energies of 100 MeV are accessible by the use of the 10^{+} charge state and reliable terminal voltages of 9.5 MV. The achromatic high energy mass spectrometer consists of a 90° analyzing magnet (r=1.1 m) followed by a multi Faraday offset cup chamber and a 30° electrostatic analyzer (r=3.5 m). The isobar separation will be done with an isotope specific multi step energy loss measurement with combinations of silicon-nitride foils, the ESA, a 4 m time-of-flight system and a gas ionization detector. Additionally a 135° magnet (r=0.9 m) can be used in gas-filled mode for measurements like ^{60}Fe.
The current project intends to use the production of ^{53}Mn and ^{3}He in iron-tianium-oxides for the isochron burial dating technique with an upper dating range of 25 Ma for long term erosion processes. So far we are able to measure (^{53}Mn/^{55}Mn) isotopic ratios with a blank value of 1.55×10^{-12}.

After the first successful ^{53}Mn and ^{60}Fe test measurements it revealed that some improvements of the new set-up should be made: (i) A larger entrance window at the ionization detector will increase the overall transmission. (ii) The Installation of time of flight detectors for the gas-filled magnet will increase the suppression. (iii) Modification of the cathode electrodes are planned to reach a better angular resolution, which will enable to discriminate scattered beam particles. By these improvements we expect to optimize the system so that we can meet the design values for the geological applications with a blank level of 1.0×10^{-13}.

In addition further improvements on the FN-AMS-setup will be performed: e.g. increasing the efficiency of the injector, especially of the ion source.