

Beam Time request for the 1 MV tandem accelerator.

Title of RESEARCH:

**ENVIRONMENTAL PROTECTION RESEARCH
Using ^{129}I in Air, Wood and Water.**

Project leader: Catalin Stan-Sion (RO) and T. Jull (USA)

Short description: The Fukushima accident produces large pollution in the Pacific Ocean and on shore. The AMS method has the highest analyzing sensitivity known today, which is 10^{-16} (ratio: isotope/element).

This experimental tool will be used in the project. Samples to be analyzed will be produced from the periodically collected sea water. For one determination ca. 1l of water is needed, from which about 10 mg of sample material will be obtained. This quantity is enough (one AMS sample weighs ca 1mg) for obtaining precise results and low errors.

AMS will use the fission isotope ^{129}I ($T_{1/2} = 15.7$ My and having stable element ^{197}I) to determine the extent of the impact of nuclear discharges from the Fukushima accident on the Western Coast of USA. Due to its high volatility and good solubility in water is a very rapid and efficient precursor of any produced nuclear releases in the environment. Produced in the fission process of a nuclear fuel it is related to the other fission products in defined quantities: $^{129}\text{I}/^{137}\text{Cs} = 1.16$, $^{129}\text{I}/^{137}\text{Cs} = 1/1.6$, $^{129}\text{I}/^{131}\text{I} = 2-50$ (depending on propagation media) etc. In this way the determination of ^{129}I provides correct estimates of all other isotopes present in the pollution.

Photo no. 1: The general layout of 1 MV HVEE AMS facility in Bucharest, Romania

The enhanced progress is that the determination of the ^{129}I by AMS will make possible realistic dose calculations and of human excretion (retention time) of radioisotopes, giving precise information of restrictive/protection requirements. This is a great advantage in respect to classical methods of using radiation detectors. Specialized or not for different radiations or particle detection they will give only a qualitative/estimative answer to the nuclear radiation dose.

Photo no. 2: The AMS sample holder containing inserted sample material in the tiny hole. In the background of the photo one can see a part of the carousel containing 50 samples.

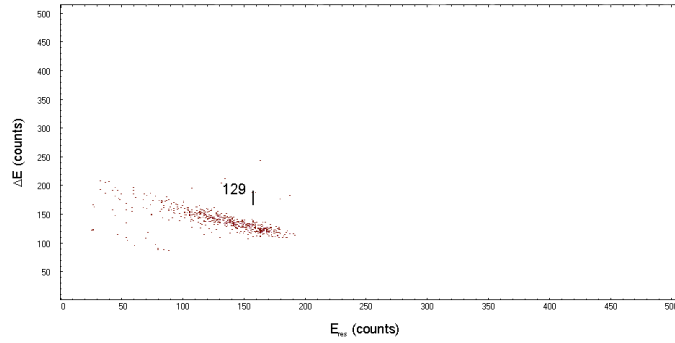


Fig.1: ^{129}I atoms selected and detected by AMS in a water sample from the Black Sea.

Finally, it is possible that also the content of other isotopes like ^{239}Pu , ^{240}Pu and ^3H to determined in this investigation. We expect that such results will be highly useful for the quality of life and will provide de knowledge for protection of such events.

Requested beam time:

3 x 7 days , first period end November , second period in February and last in May , next year.