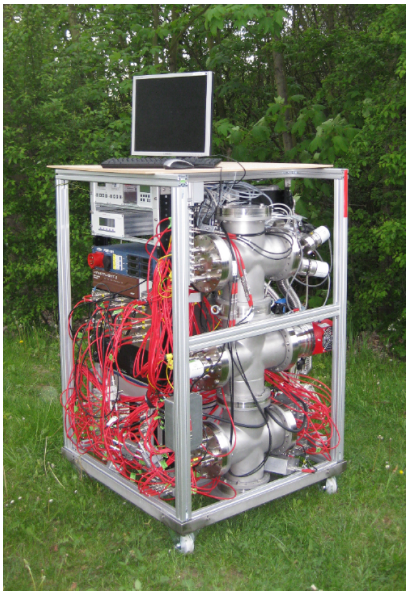
JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

II. Physikalisches Institut

IONAS

Scientific Problem

High resolving mass measurements in analytical mass spectrometry using a mobile Time–of–Flight mass-spectrometer.



Motivation

Mass spectrometry is an integral part of science, used to investigate nuclear structure, identify and quantify unknown chemical compounds, investigate the stucture of molecules or determining the age of objects containing organic material.

Nowadays the use of mass spectrometers outside laboratory for e.g. gas monitoring, detection of environmental toxins, explosives or point–of–care applications becomes increasingly important.

Project

In Giessen we are using the only mobile MR–TOF–MS (Multiple–Reflection Time–Of–Flight Mass–Spectrometer) world wide, which can take in-situ analytical mass measurements with high resolving power.

To provide an unambiguous mass spectra an atmospheric ion inlet, ion–optics, operating software and data analysis are further developed, which the RISE project will be related to. Clear identification of chemical compounds is archieved by utilizing advanced techniques like tandem mass spectrometry. This is a combined effort and interdisciplinary work of nuclear physics and analytics.

Work Group

The AG Scheidenberger is doing research on exotic nuclei, for which a stopping cell and a high resolving MR–TOF–MS is developed at the FRS ion catcher at GSI in Darmstadt.

A mobile MR–TOF–MS was designed and built in Giessen. Using techniques from the device at the GSI and bringing in ideas to advance at analytical spectrometry, this device is now able to record high resolving mass spectra of analyts composed of different biological compounds. Using advanced techniques, adapting and optimizing the instrument in a new environment can be done in a very short time, allowing for fast in-situ measurements.

The work group consists of about 20 people and provides a friendly and close work athmosphere.

Location

Giessen is located nearly in the geographical center of Germany just ca. 60 km north of Frankfurt. As the regional center of Middle-Hessia, Giessen is a well-known shopping town, cornered by a bunch of cultural activities, ranging from cinemas and theaters to museums, and a lot of sport activities. The river Lahn provides the possibility for canoeing and rowing. Within hiking and biking distances there are ample opportunities for spontaneous short-term excursions to nearby picturesque medieval towns, old castles, remains of historic roman settlements and Celtic habitats, lakes and forests.

Due to the very central location and good infrastructure of region, many big European cities, such as Berlin, Paris, Prague, Amsterdam, Munich, etc., can be reached by train or bus within a few hours.

University

Giessen is the town with highest students-to-inhabitants ratio in Germany. 28,000 out of its 84,000 inhabitants are students of Justus-Liebig University and University of Applied Sciences. The Justus-Liebig University (JLU) was founded in 1607, which makes it one of the oldest institutions of higher education in German-speaking world. It provides the full spectrum of academic activities in education and research in such fields as liberal arts, veterinary medicine, law, business, economics, mathematics, etc.

Physics also has a long tradition at JLU. The most widely known professor is probably W.C. Roentgen, famous for the discovery of the X-rays and first Nobel laureate ever in physics. At present, the physics department of JLU has strong research groups in solid state physics, material science, applied physics, experimental and theoretical nuclear and hadron physics. The activities of the latter groups have a natural overlap to astrophysics.

Contact: *Julian Bergmann*, julian.bergmann@physik.uni-giessen.de, +49 (0)641 99-33251
Website: http://www.uni-giessen.de/ionas