

## **Improvement of the resolving power of Cassinian Ion Traps**

### **Project Overview:**

Cassinian ion traps are composed of specially shaped electrodes that let ions fly for long time on a closed path. These ions induce voltage with a certain frequency, that can be used to identify the ion mass. With help of geometry changes this project aims at increasing the mass resolving power. Suitable geometries will be tested with help of FEM simulations.

### **Eligible Departments:**

Electronics	<b>X</b>
Communications	
Networking	

### **Software/Hardware:**

Will be provided

### **Relevant References:**

Influence of the trap length on the performance of Cassinian Ion Traps: A Simulation Study

DOI: 10.1016/j.ijms.2018.12.017

## **Numerical analysis of a segmented electrode Cassinian Trap**

### **Project Overview:**

Cassinian ion traps are composed of specially shaped electrodes that let ions fly for long time on a closed path. These ions induce voltage with a certain frequency, that can be used to identify the ion mass. The geometry is relatively complex and therefore difficult to manufacture. A simplification could be to build up the geometry by combining smaller segments. This project aims at analyzing to which extent a segmented set up can induce the same electric field geometry as a continuous set up with help of FEM simulations.

### **Eligible Departments:**

Electronics	<b>X</b>
Communications	
Networking	

### **Software/Hardware:**

Will be provided

### **Relevant References:**

Numerical analysis of segmented electrode Orbitraps

DOI: 10.1016/j.ijms.2015.12.001

## **Recording of 2D spectra in segments**

### **Project Overview:**

Oscilloscopes allow recording recurring events like e.g. spectra in segmented form, i.e. they record and store spectrum after spectrum with a certain periodicity achieved via triggering. These can then be displayed as 2D spectra, e.g. color maps. The number of spectra that can be stored is often quite limited. In this project, MCU (e.g. Arduino, STM Nucleo) should be used to record simulated spectra (output of function generator) in such segments and transfer the data to the PC in parallel to the sampling. The project will be coded in Embedded C and Labview. Advanced synchronization as well as sampling techniques have to be tested in order to maximize the sampling rate. The goal is to overcome the segment limitations of typical oscilloscopes in an economic fashion.

### **Eligible Departments:**

Electronics	<b>X</b>
Communications	
Networking	

### **Software/Hardware:**

MCU (will be provided), Arduino IDE/Keil, Labview (all available for free/in test versions)

### **Relevant References:**

N/A